HIWIN®
Linear Motion Products & Technology

2011 HIWIN
New Product Introduction

- *New Circulating Series*
- *Roller Screw*
- *Recirculation Divide Series*
- *Dustproof BS*
- *HIWIN grease*
- ***R2 Series_待完成***

Reporter : Mark Huang

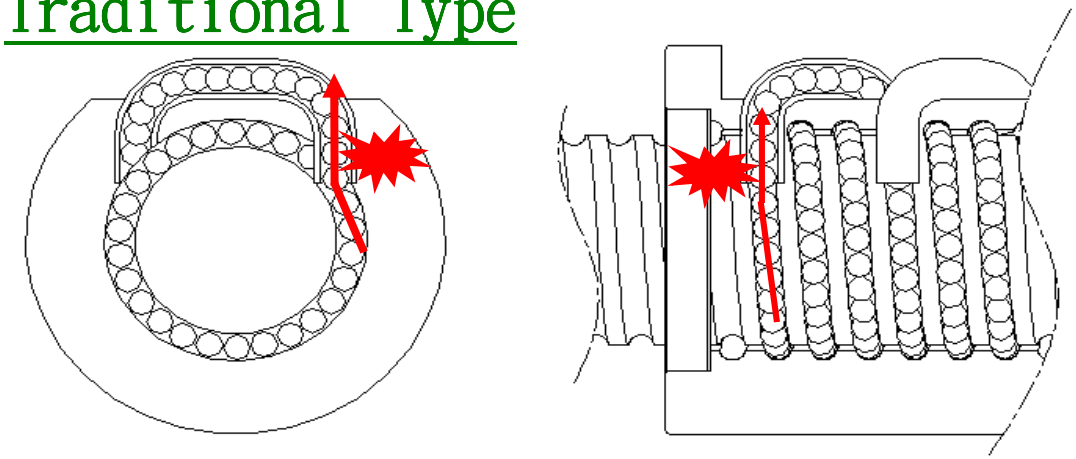
TÜV OHSAS 18001 · TÜV CERT ISO 14001 · ISO 9001 SGS · It's Very Well Made In Taiwan

NCQ2 Series

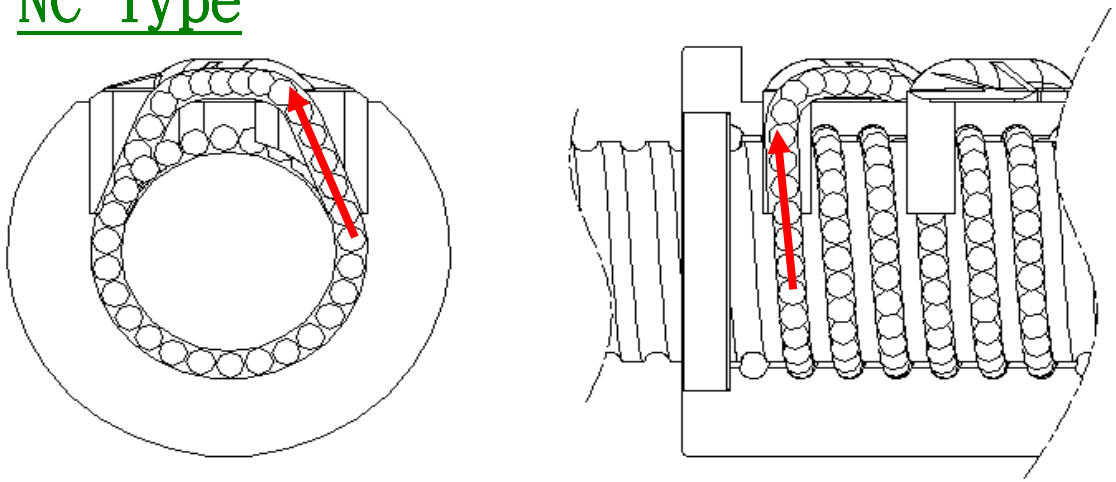
New Circulating Series with SynchMotion™ Technology

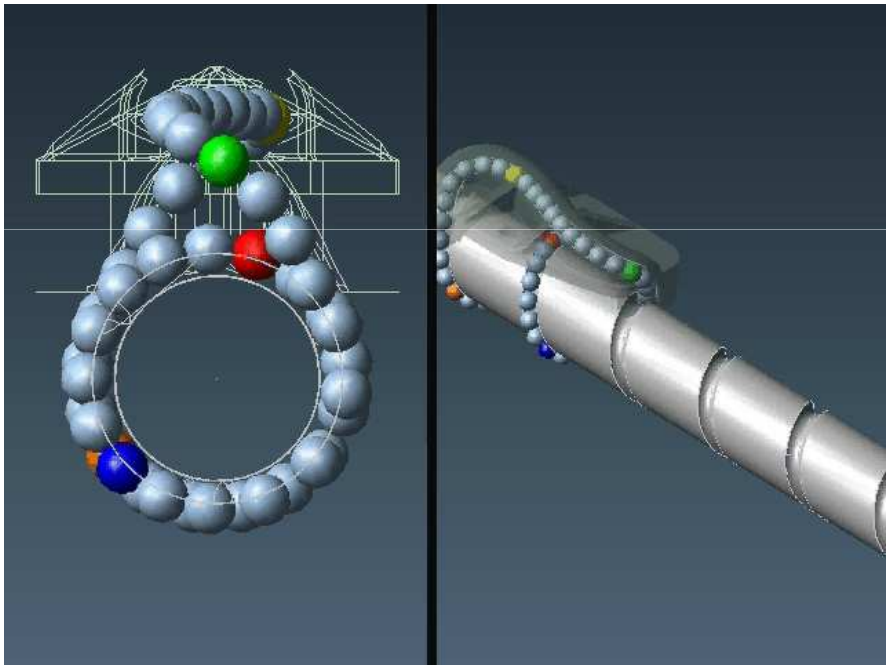
Product Feature

Traditional Type



NC Type



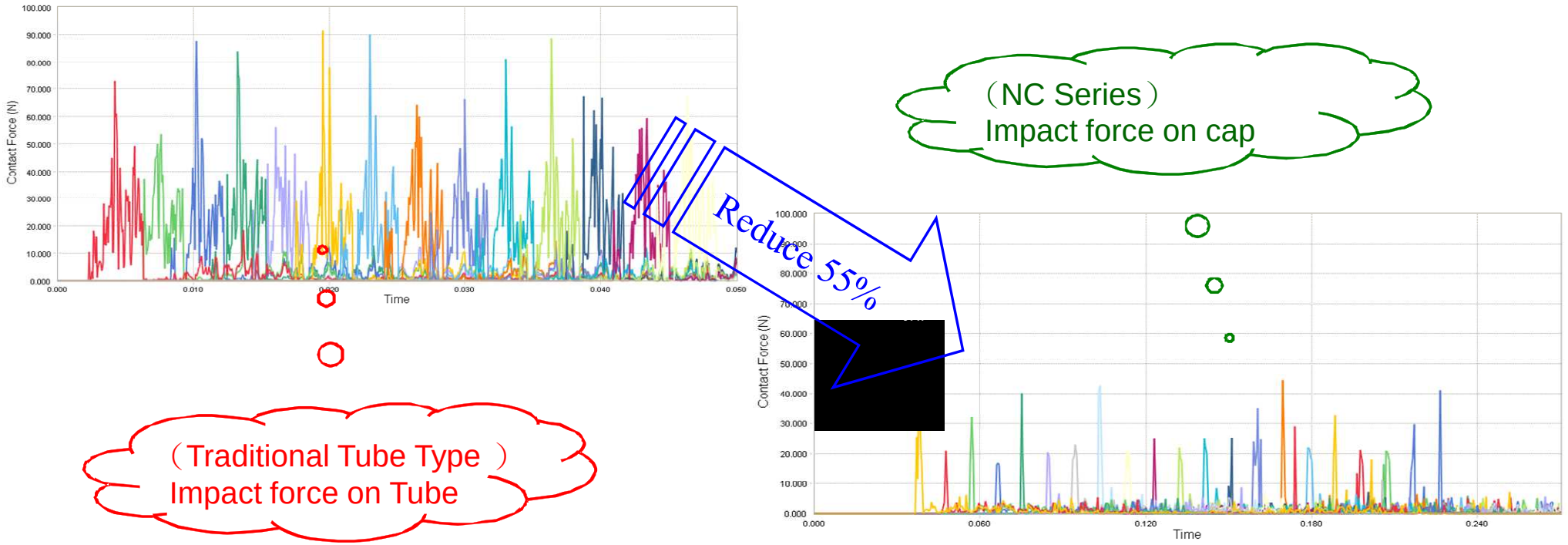


Product Feature

i. Lower Noise — 4~7 dB Lower than Traditional Tube type

ii. High DN Value — DmN Value reach 160,000 (more than 4500RPM)

iii. High Acceleration — Linear Acceleration reach 1.5 G



Design Concept

Application : Actuator、Single Robot

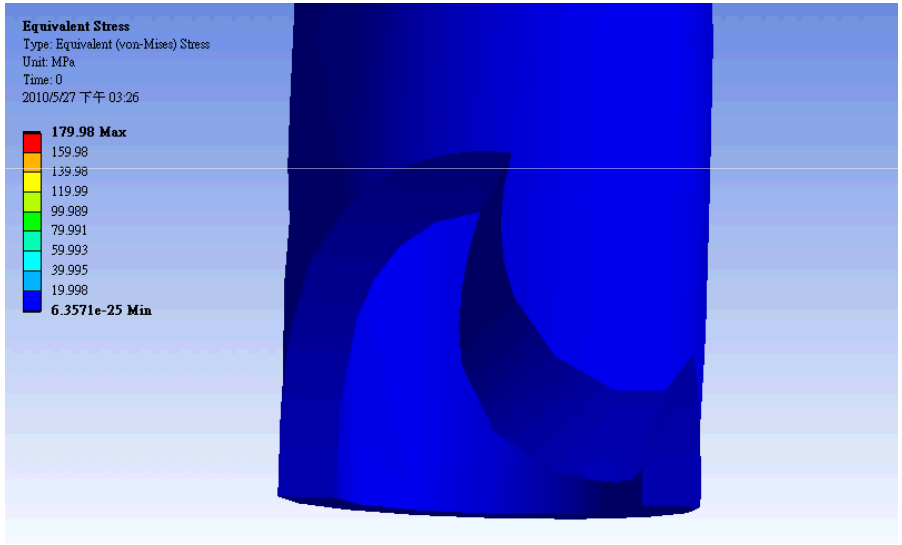
The new external recirculation type is to improve the speed, acceleration, and noise in the traditional system.

Static Analysis

FEA (*Finite Element Analysis*) on the circulation system.

Strength and Stress of the tube.

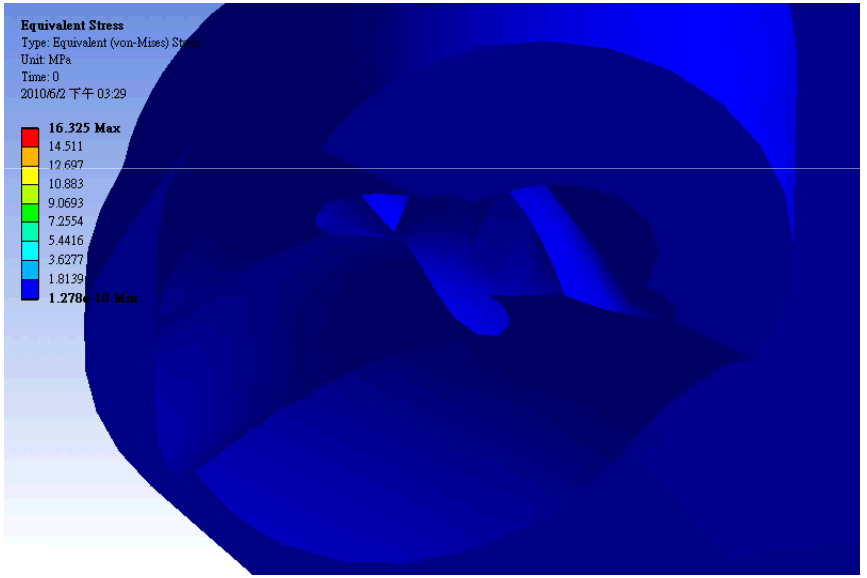
Traditional



Traditional Tube type

$\sigma_{max} = 179.98 MPa$

NC series



NCQ2 Series

$\sigma_{max} = 16.325 MPa$

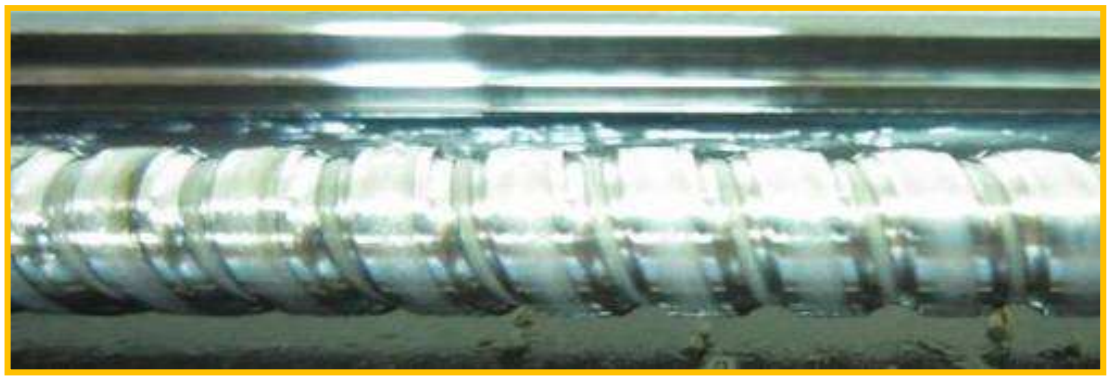
Product Feature

The ***NCQ2*** Series ballscrew with SynchMotion™ Technology offers smooth movement, superior lubrication, quieter operation and longer running life.

NCQ2 Series – Service life and Rotation speed of ball chain

Testing Condition

Testing Bench	SK test equipment	**Specification**	R12-5B1-SSTSKQ2
Rotation Speed	4500 rpm	**Load**	30 kg
Acceleration	0.2 G	**Stroke**	700 mm
Predition of Service Life	1000 km	**Service Life**	2630 km



NC Series – Drag Torque

Testing Condition

Specification	R12-5B1-FST(Q2)	**Rotation Speed**	100 rpm
Instrument	Drag Torque Testing Bench	**Lubrication**	ISO VG 68

NC Series Drag Torque

C.W.：-0.30728 ~ -0.79483 kgf-cm
C.C.W.：-0.31542 ~ 0.85386 kgf-cm
Variation Range of C.W.：0.487 kgf-cm
Variation Range of C.C.W.：0.538 kgf-cm

NC Series Drag Torque
(with SynchMotion™ technology)

C.W. ：-0.26176 ~ -0.59102 kgf-cm
C.C.W.：0.26915 ~ 0.6663 kgf-cm
Variation Range of C.W. ：0.33 kgf-cm
Variation Range of C.C.W. ：0.397 kgf-cm

Variation reduce 26~32%

Compare with Competitor

	HIWIN *NC Series*	T. company *HBN*	N. company *SRC*
Spec	8 ~ 40	32 ~63	50 ~120
Outer Dia. of Nut	Small	Big	Small
DmN Value	160,000	130,000	140,000 ~ 160,000
With Spacer	Y	Y	Y
With Chain	Y	N	N
Temperature	Lower than 80˚C	Lower than 80˚C	Lower than 70˚C

Specification

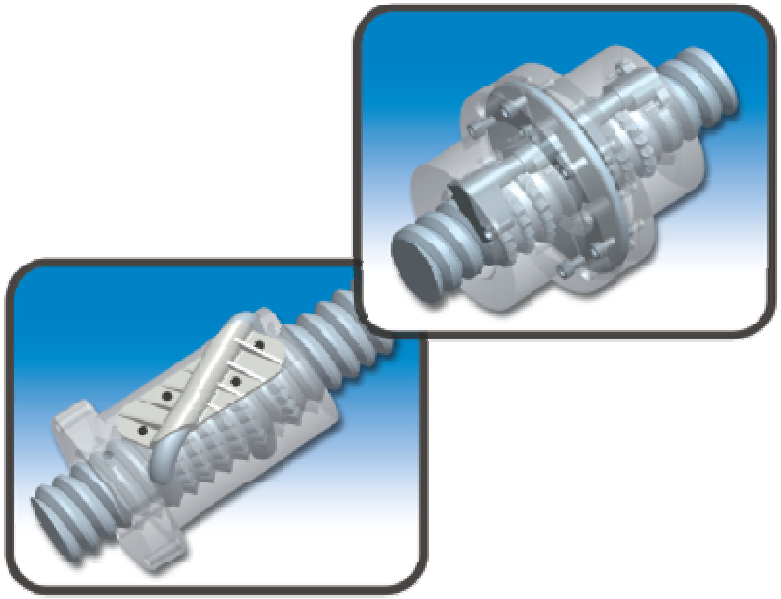
Developing

Number of Turns	*Nominal Dia.*	*Lead*	*Ball Dia.*
A	12	5	2.381
A	12	10	2.381
B	15	10	3.175
A	15	20	3.175
A	20	20	3.175
A	25	25	3.969
B	36	16	6.35
B	40	12	7.144
B	12	5	2.381
A	15	20	3.175
B	40	8	4.763
B	40	10	6.35

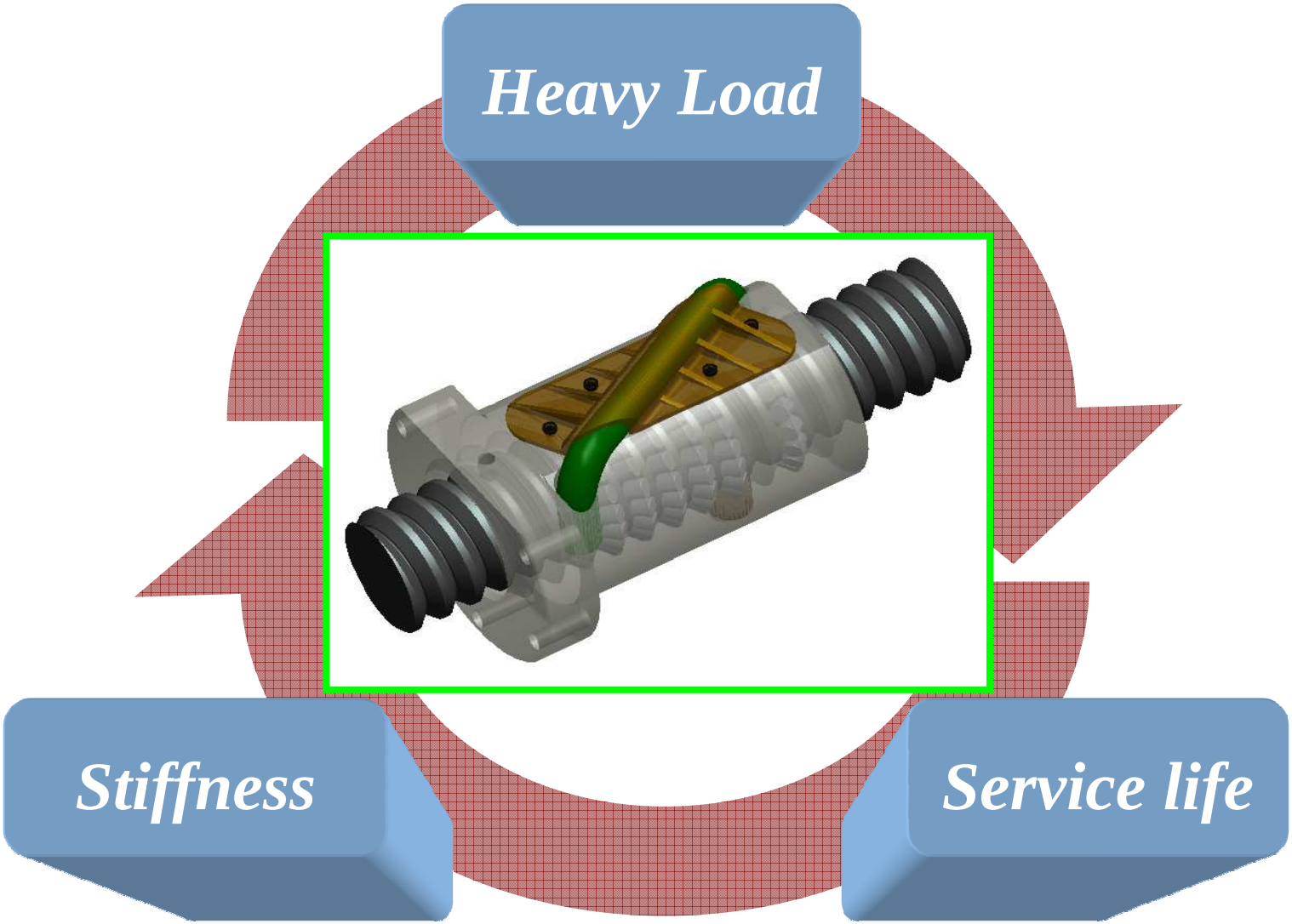
***NC* Series**

***NCQ2* Series**

Roller Screw



Feature



Heavy Load –

Static load is 1.5~2 times compare with ball screw.

Service Life –

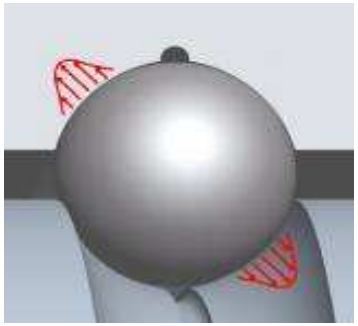
The service life is 50% more than ball screw.

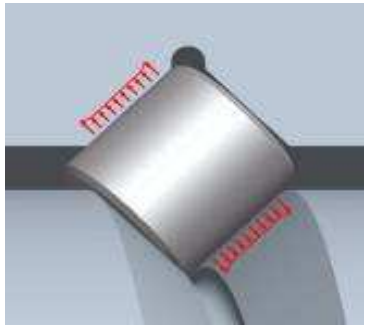
Stiffness –

Stiffness is 50% more than ball screw .

Theory of Contact

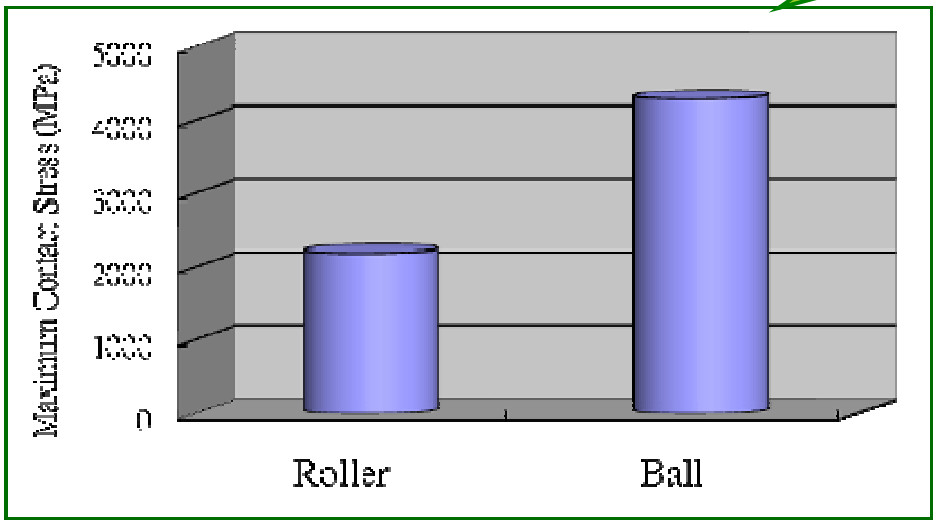
- *Calculation of Stress and Deformation (Hert's Theory)*



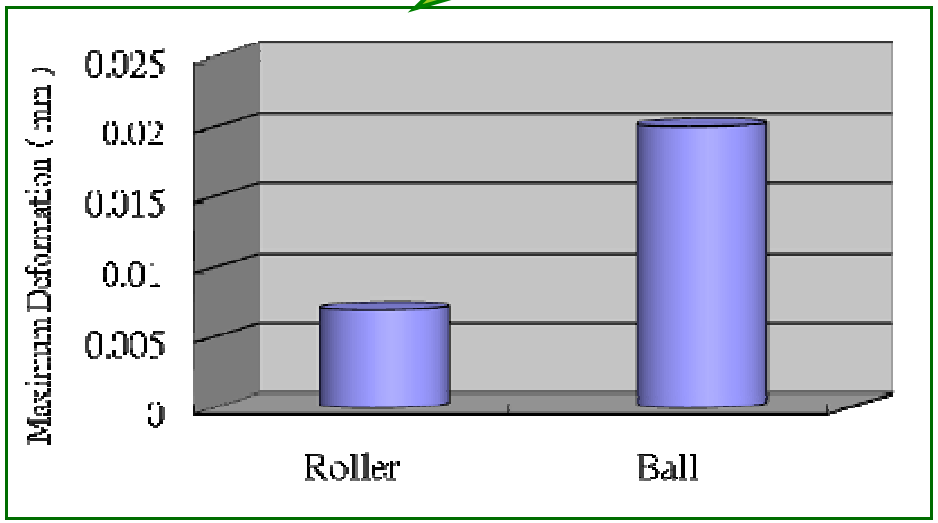


Under the same force, stress of roller is half compare with ball. So the roller is able to against 2 times force compare with ball.

Under the same force, the maximum deformation of roller is about 1/3 compare with ball. It means that the stiffness is 3 times than ball.

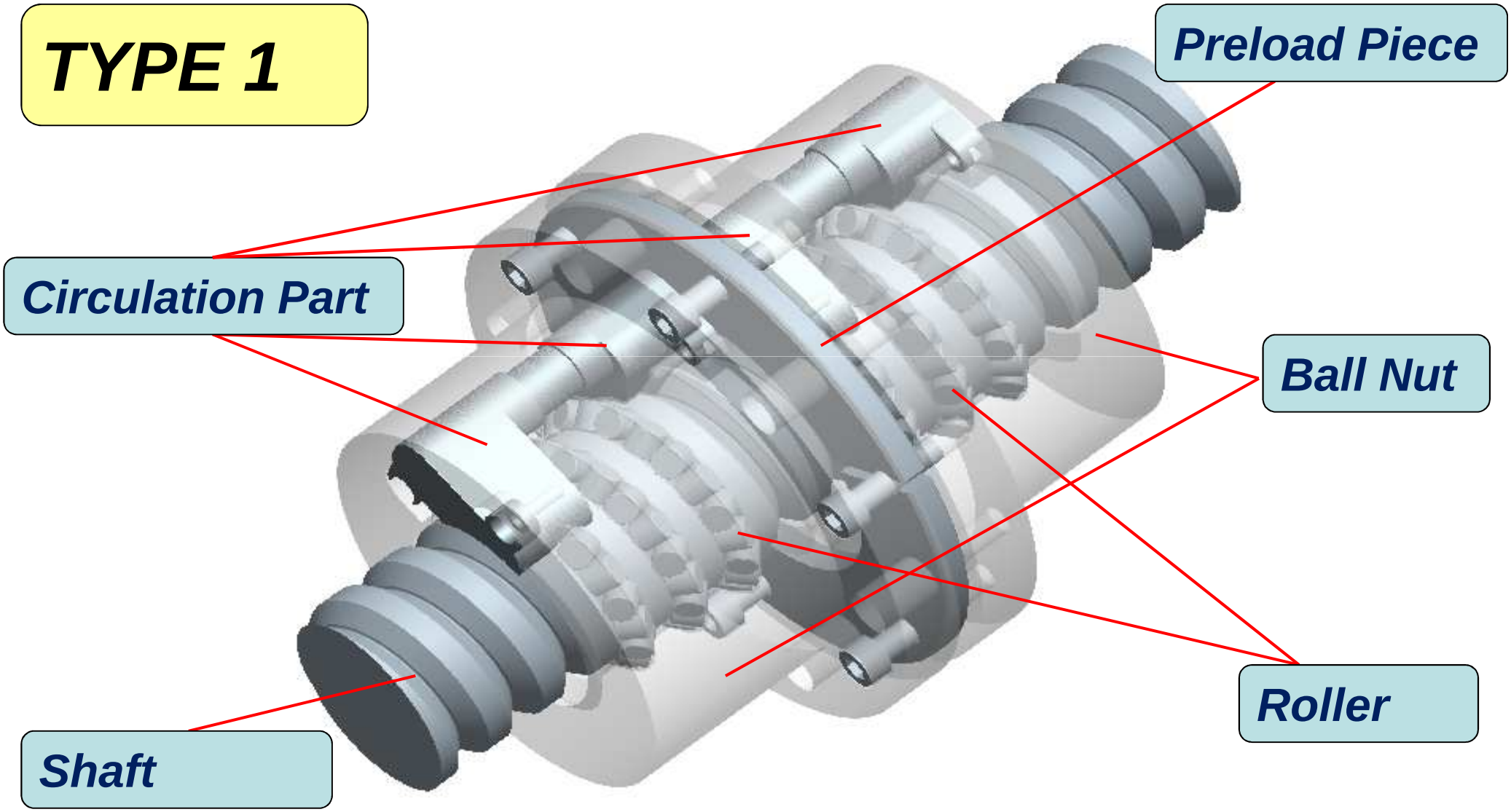


Stress Between ball and roller



Deformation between ball and roller

TYPE 1 – Cross Type



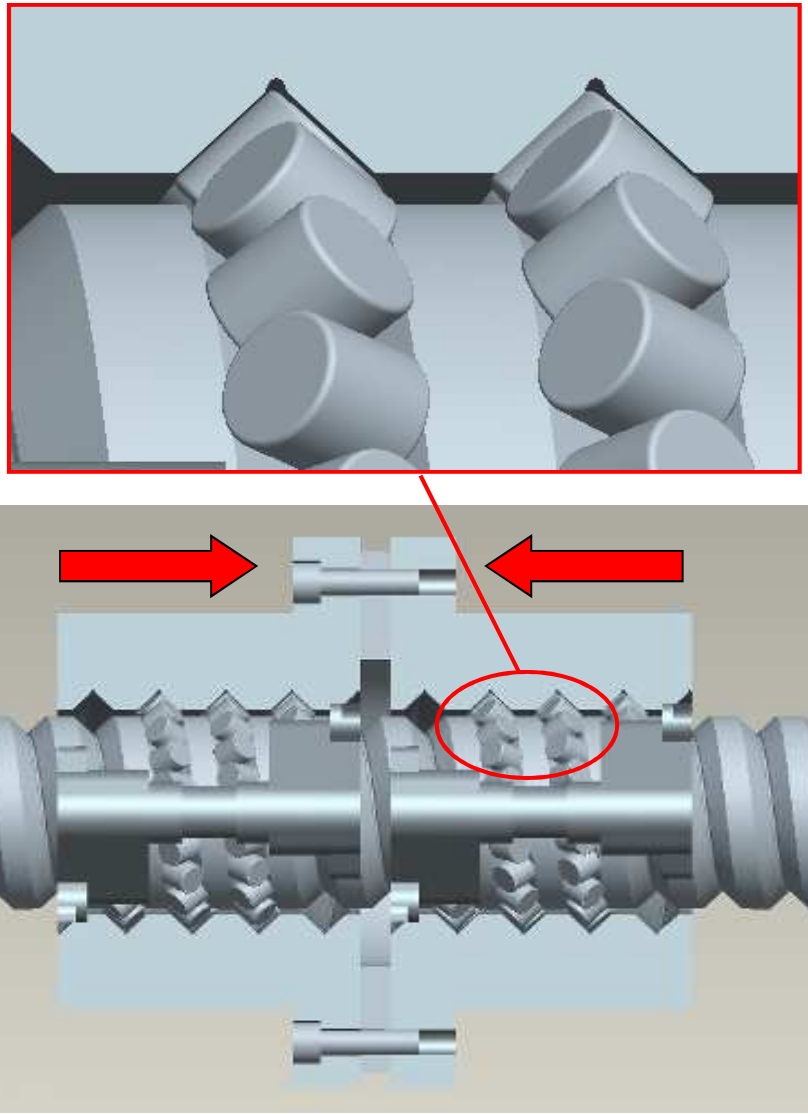
TYPE 1 — Cross Type

Feature

– Roller is arranged in cross state. Each direction of axial load is against by half roller.

– Dynamic/Static load and stiffness is 50% higher than ball screw。

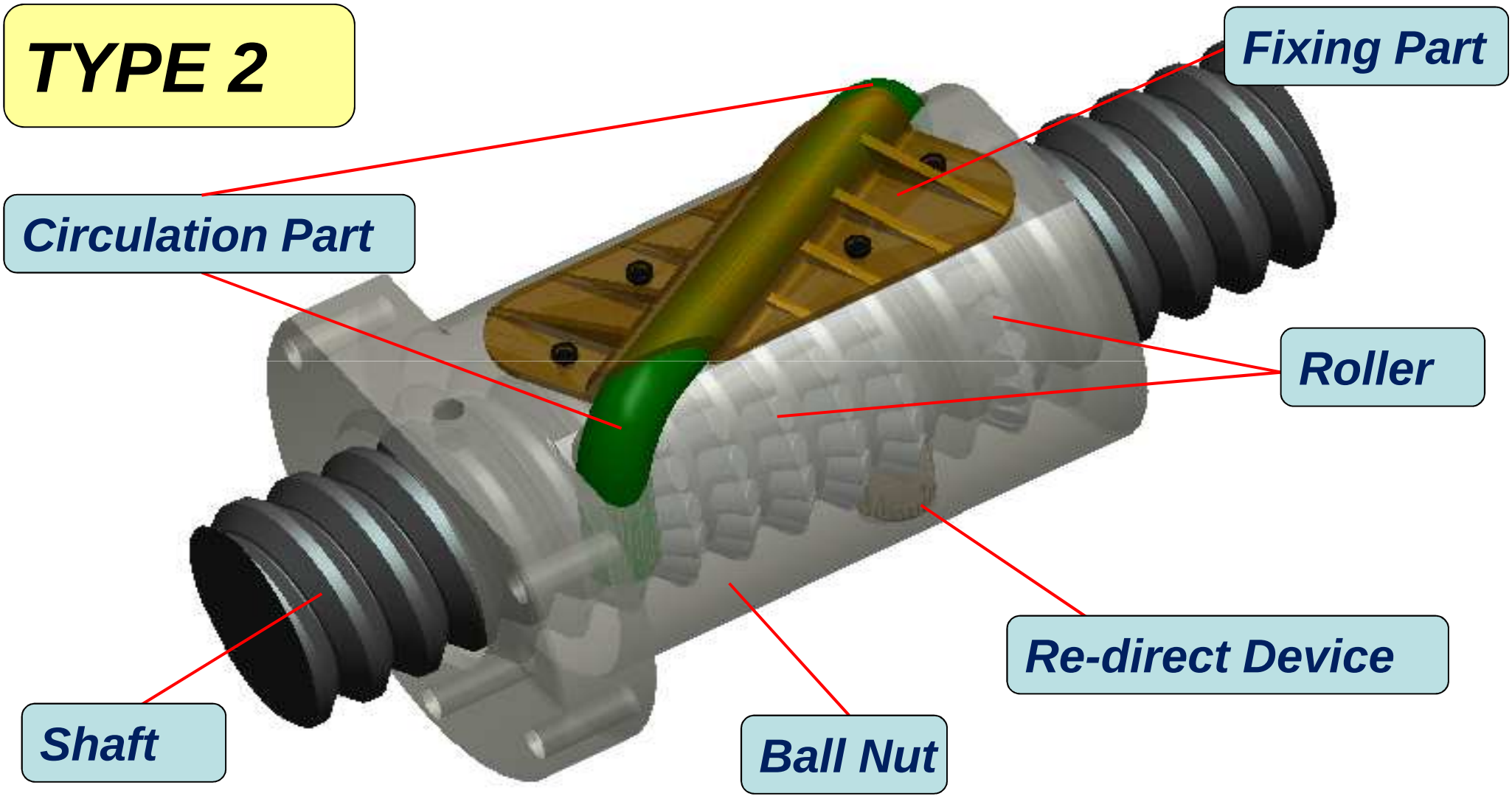
– Design for precision position application。



Application

– CNC Machine、Precision Machine、Special Purpose Machine。

TYPE 2 –Thrust Load



TYPE 2 —Thrust Load

Feature

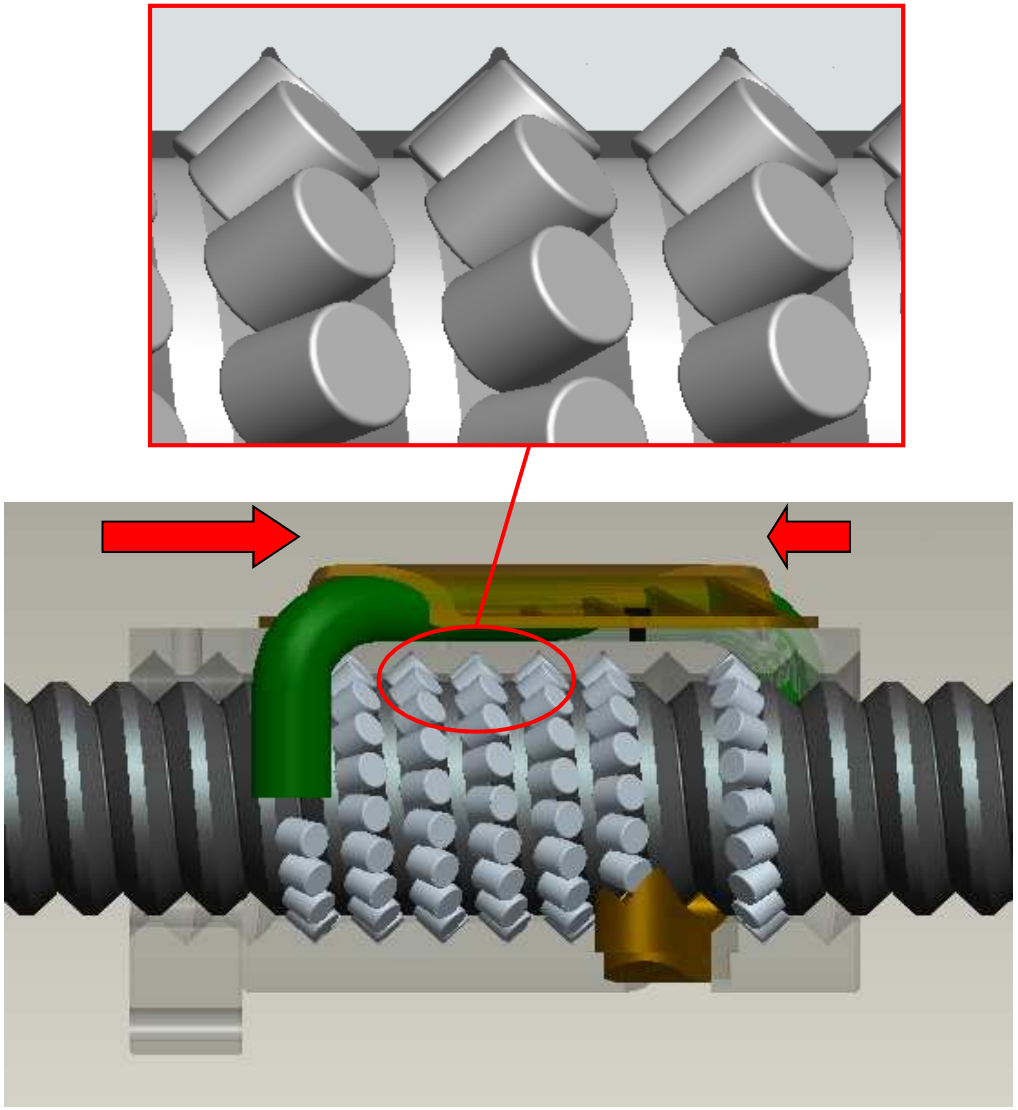
– Roller is arranged in same direction. Most in flange side. Others is the opposite side.

– The type is for one direction axial load application。

– Especially for high load application。

Application

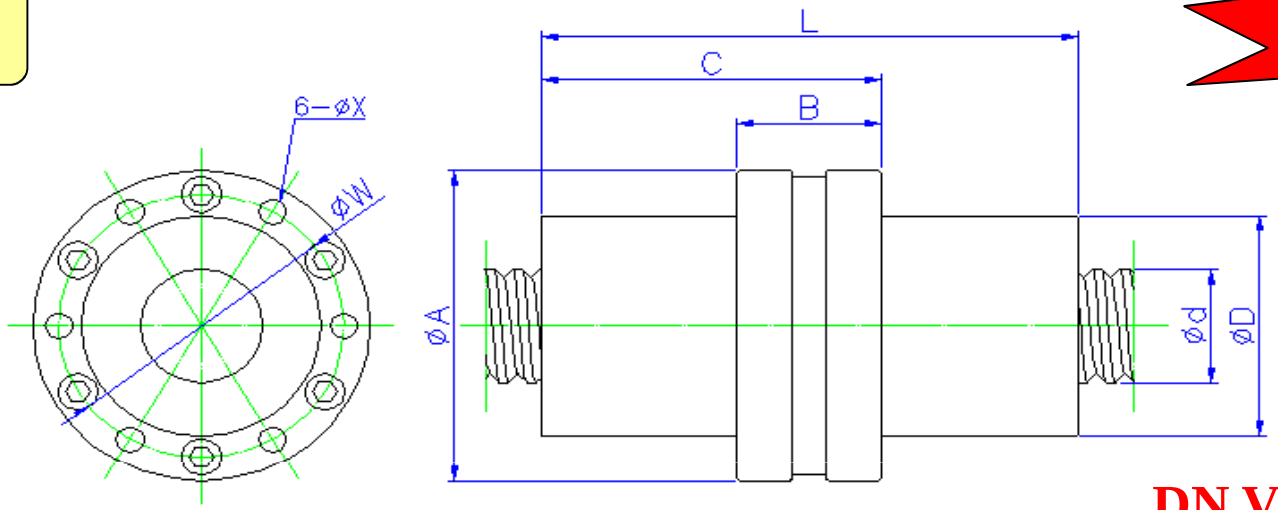
– All electric molding machine、Press Machine.



Specification – Cross Type

TYPE 1

Developing



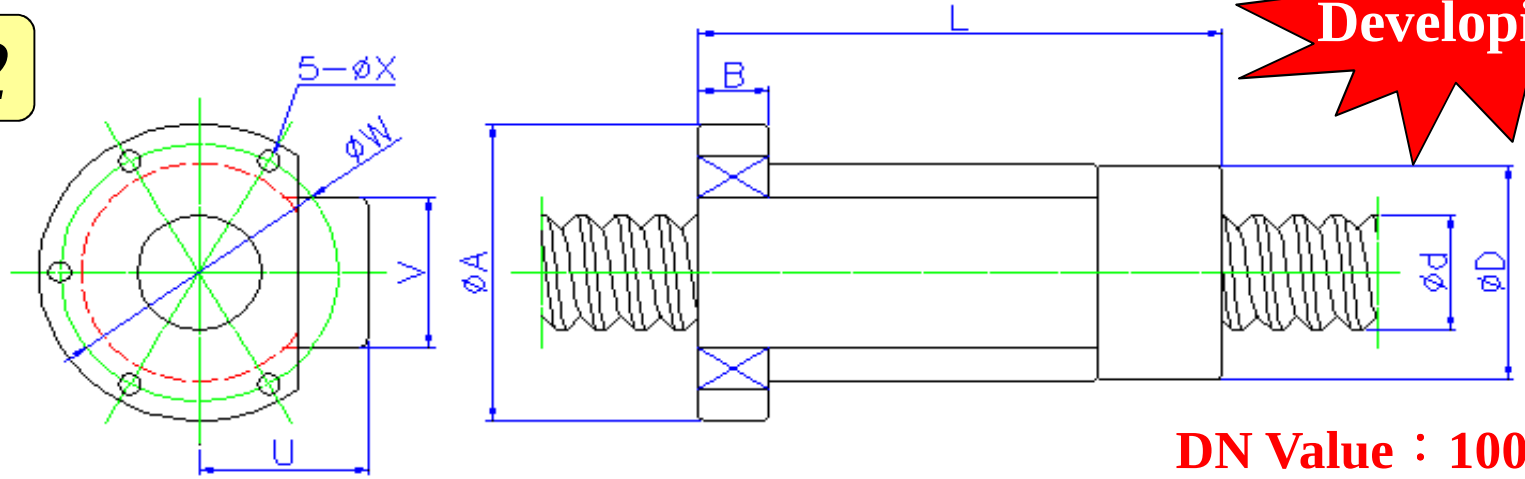
DN Value：100,000

Spec	Nominal Dia.	Lead	Roller	No. of Circuit	Stat. / Dyna. Load		Dimension of Nut						
					C (kN)	Co (kN)	D	A	B	C	L	W	X
32-10K6	32	10	5	6	90 (65)	504 (171)	70	102	47	111	175	85	9
36-10K6	36	10	5	6	96 (69)	590 (194)	74	106	47	111	175	89	9
40-10K6	40	10	5	6	100 (73)	631 (217)	78	110	47	111	175	93	9
45-10K6	45	10	5	6	105 (78)	707 (252)	83	115	47	111	175	98	9
50-10K6	50	10	5	6	112 (81)	809 (275)	88	120	47	111	175	103	9

Specification – Thrust Load

TYPE 2

Developing



DN Value：100,000

Spec	Nominal Dia.	Lead	Roller	No. of Circuit	Stat. / Dyna. Load		Dimension of Nut							
					C (kN)	Co (kN)	D	A	B	L	W	X	MAX U	MAX V
50-16K8	50	16	10	8	357 (306)	2150 (818)	95	129	28	210	112	9	68	66
63-16K8	63	16	10	8	401 (343)	2692 (1050)	105	139	28	210	122	9	72	76
80-16K8	80	16	10	8	445 (382)	3369 (1340)	120	154	32	210	137	9	80	92
63-20K8	63	20	13	8	575 (457)	3634 (1320)	117	157	32	265	137	11	83	81
80-20K8	80	20	13	8	646 (511)	4550 (1690)	130	170	32	265	150	11	90	96
100-20K8	100	20	13	8	700 (571)	5466 (2140)	145	185	32	265	165	11	97	113
80-25K8	80	25	16	8	832 (663)	5506 (2020)	145	185	40	330	165	11	102	100
100-25K8	100	25	16	8	936 (734)	6893 (2550)	159	199	40	330	179	11	108	118

Comparison with Ball Screw

Ball Dia.	Φ6.35	Φ12.7	Φ15.875	Φ19.05
Roller Dia.	Φ5	Φ10	Φ13	Φ16
TYPE1	○	○		
	Shaft Dia. 32~50	Shaft Dia. 63		
TYPE2		○	○	○
		Shaft Dia. 50~80	Shaft Dia. 63~100	Shaft Dia. 80~100

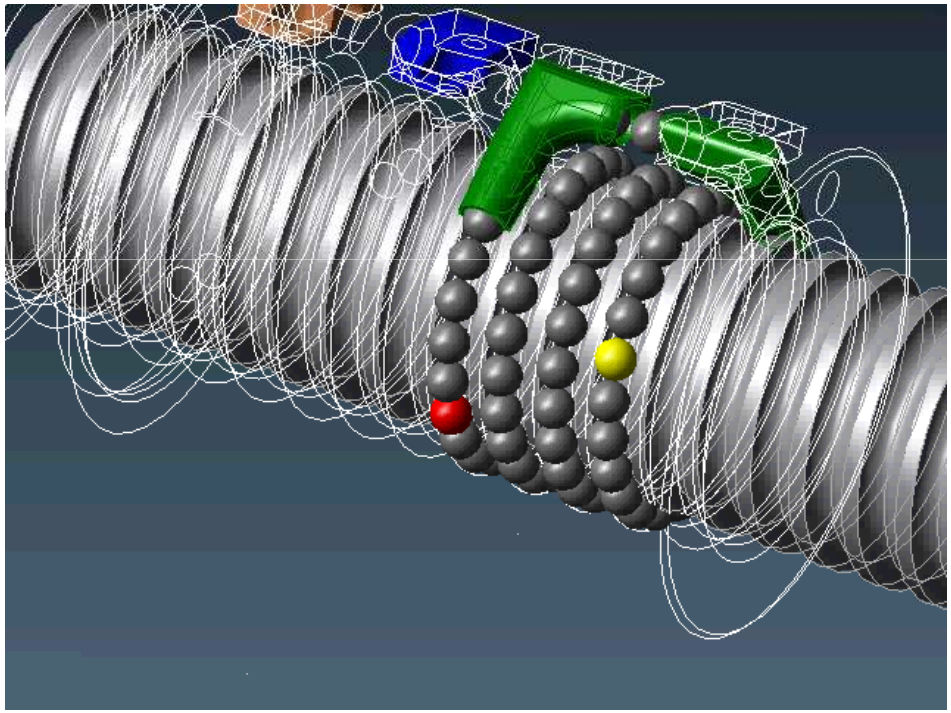
RD Series

Recirculation Divide Series _ Heavy Load

RD Series Application

[All Electric Molding Machine]

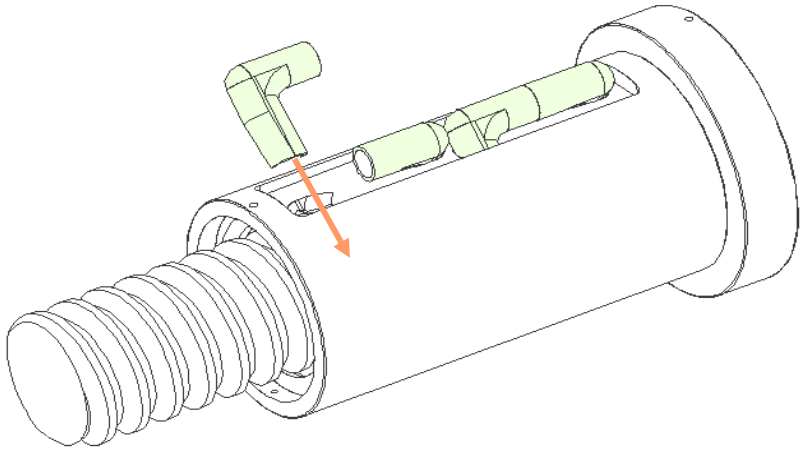
Ball Dia.: ϕ7.144 ~ ϕ 19.05 mm
Shaft Dia.: ϕ 50 ~ ϕ 120 mm
Lead : 16 ~ 25 mm
Accuracy : JIS Ct7
(*Spacer*)



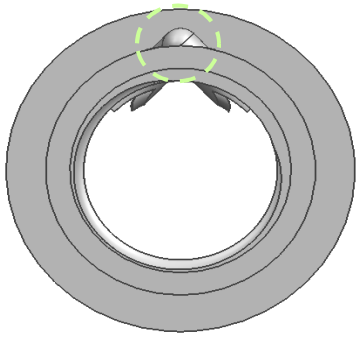
[Machine Tool]

Ball Dia. : ϕ 6.35 ~ ϕ 9.525 mm
Shaft Dia.: ϕ 40 ~ ϕ 80 mm
Lead : 8 ~ 40mm
(*Offset Preload*)

Feature

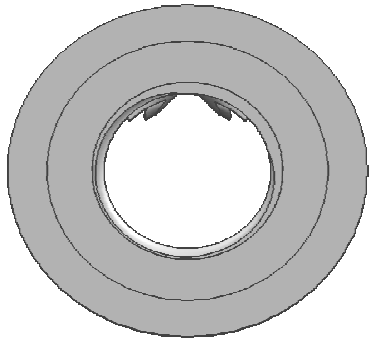


[Install From Radial Direction]



[P Type]

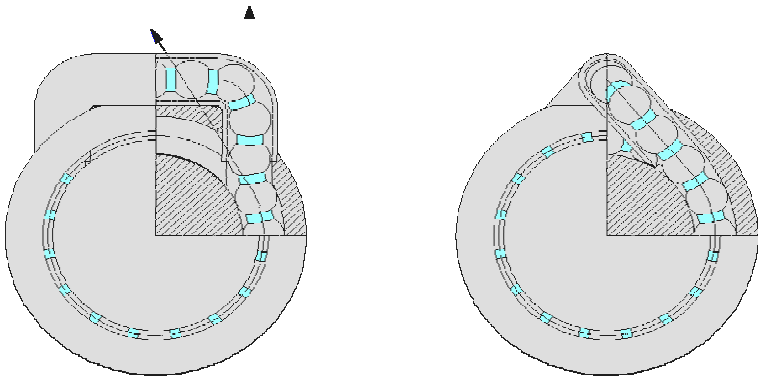
Equivalent to V type



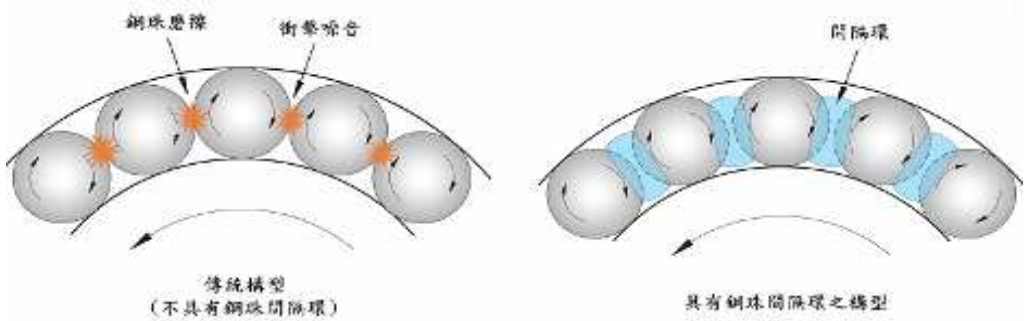
[S Type]

Equivalent to W type

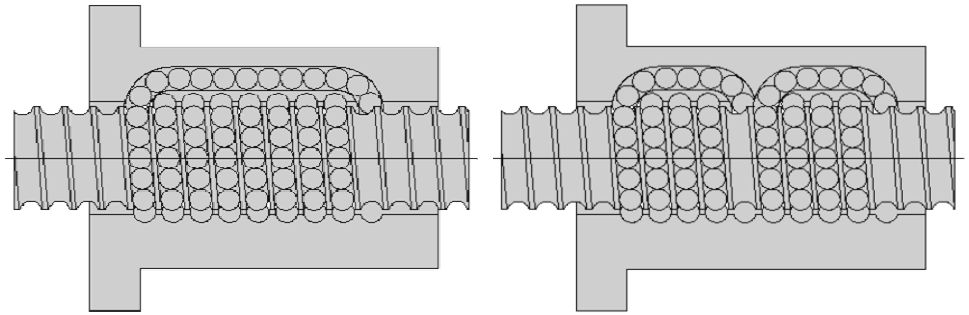
[Tangent to PCD]



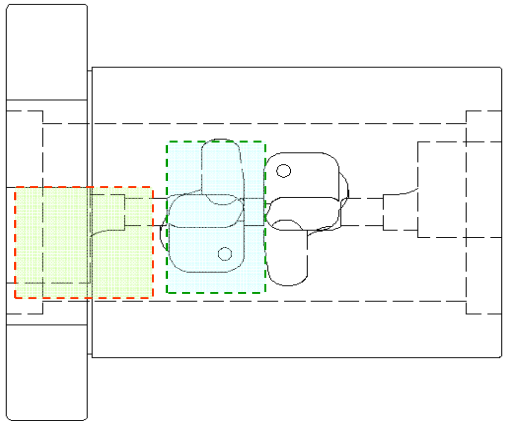
[Optional: Spacer]



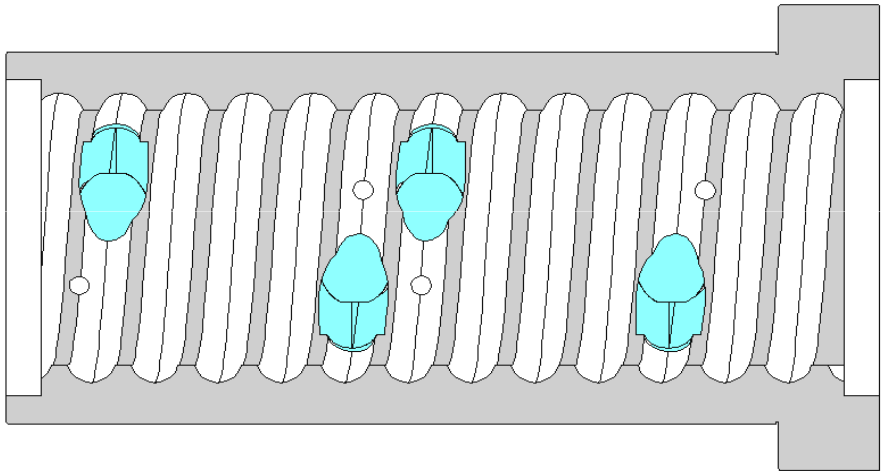
Feature



[Divide The Ball Circuit]
Heavy Load and Machine Tool



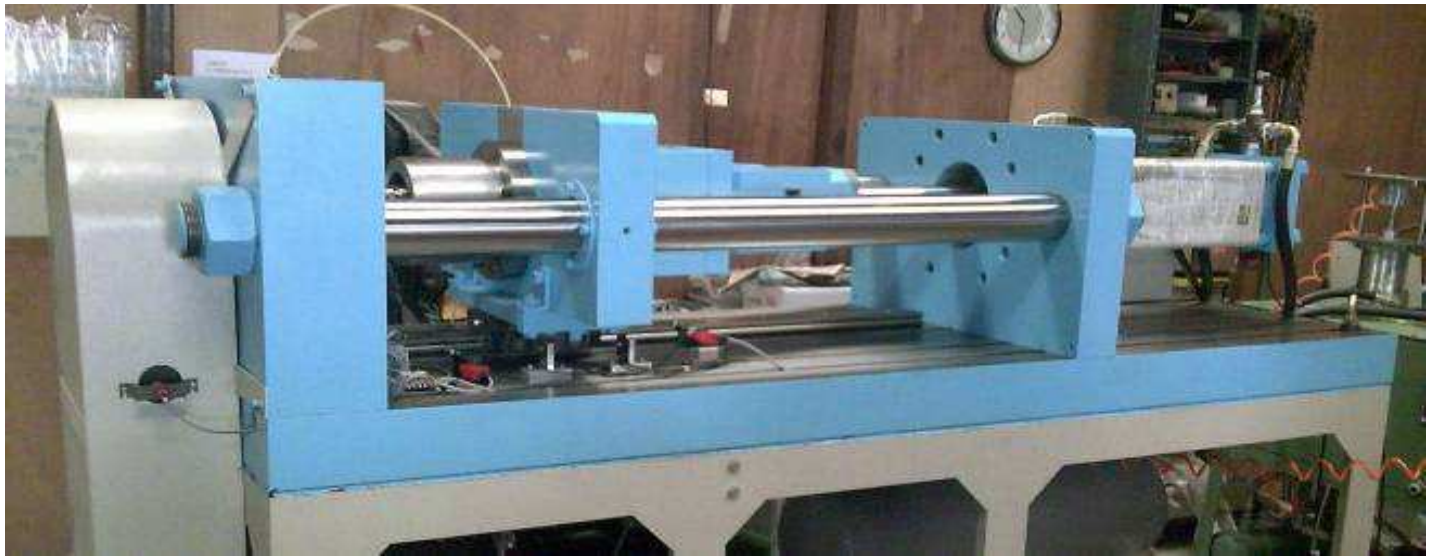
[Offset Preload]
Machine Tool



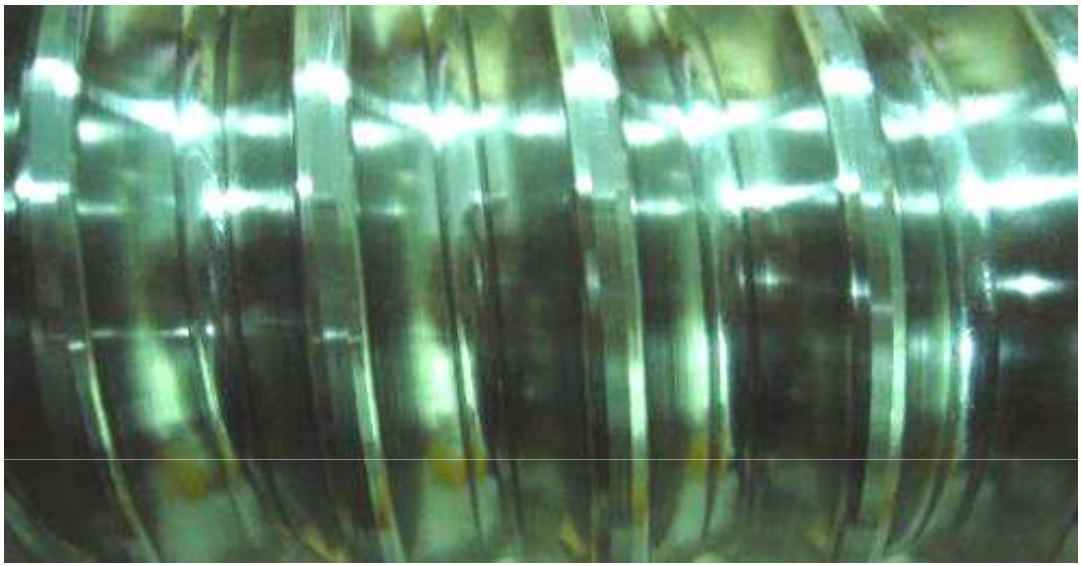
[Compact Circulation Part]
Capable for Big Ball Diameter with Small Lead
Heavy Load

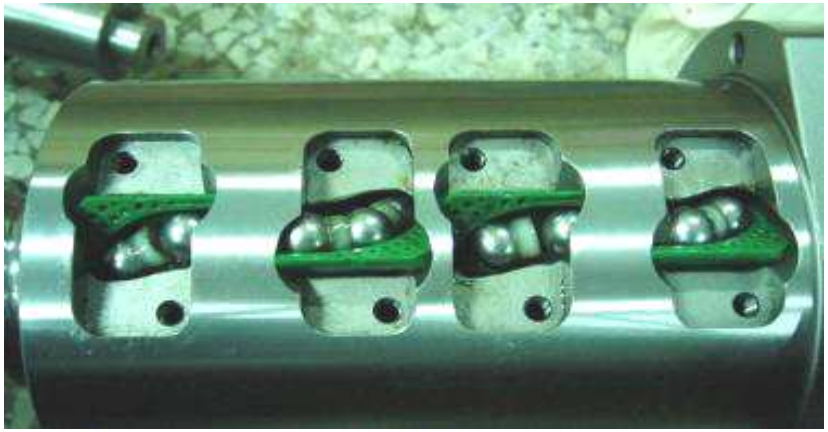
Testing – Service life

Spcification	R63-16K8-FSC-450-565-0.0023-L
Dyna. Load	38000 kgf
Max. Axial Load	30 ton
Max. Rotation Speed	100RPM
Ball Diameter	12.7mm
Lubrication	MY-2



Testing - Endurance of the Spacer





RD Series

Nominal diameter	Lead	Ball Dia.	Number of Turns	With Spacer
50	16	12.7	8	V
63	16	12.7	8	V
63	16	12.7	10	V
80	16	12.7	10	V
63	20	15.875	8	V
80	20	15.875	10	V
100	20	15.875	10	V
120	20	15.875	8	V
63	25	15.875	10	V
80	25	19.05	8	V
100	25	19.05	8	V
120	25	19.05	10	V

ENGEL

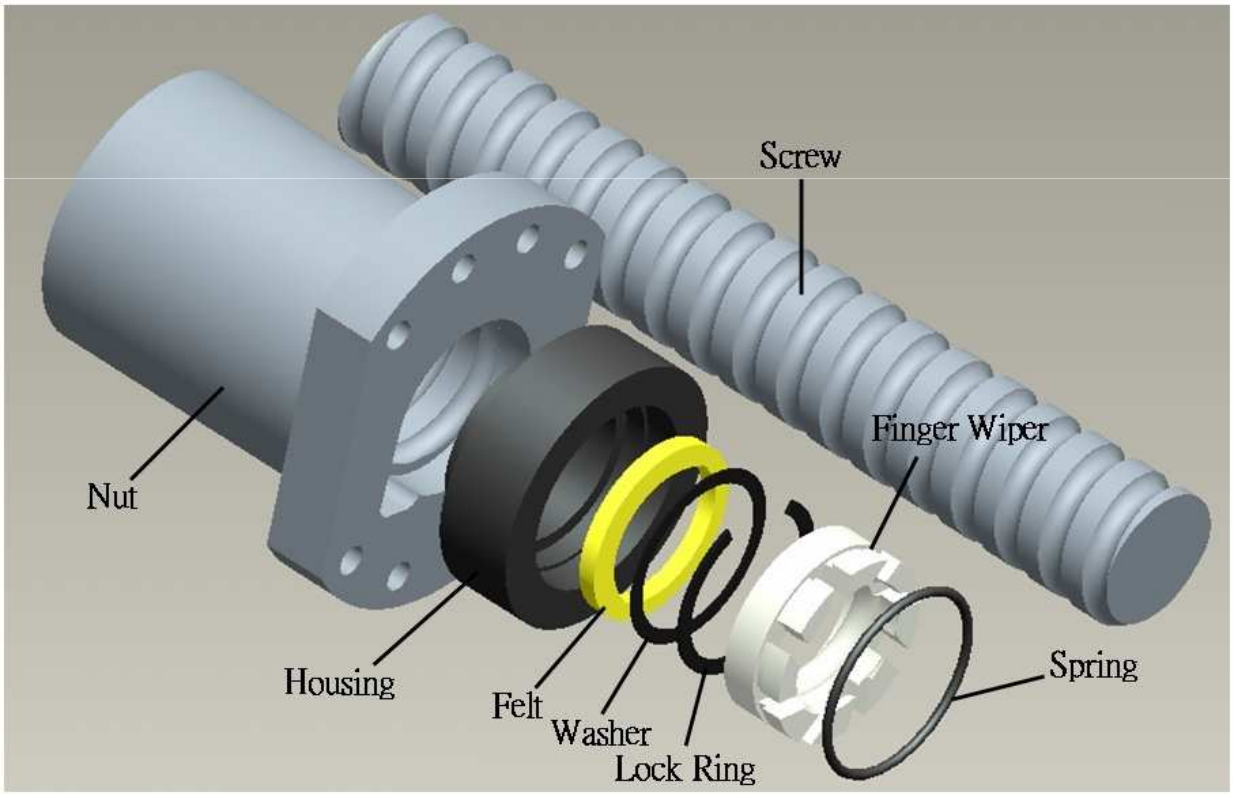
FERROMATIK MILACRON

JIENFA

三菱重工

Battenfeld

DustProof BS

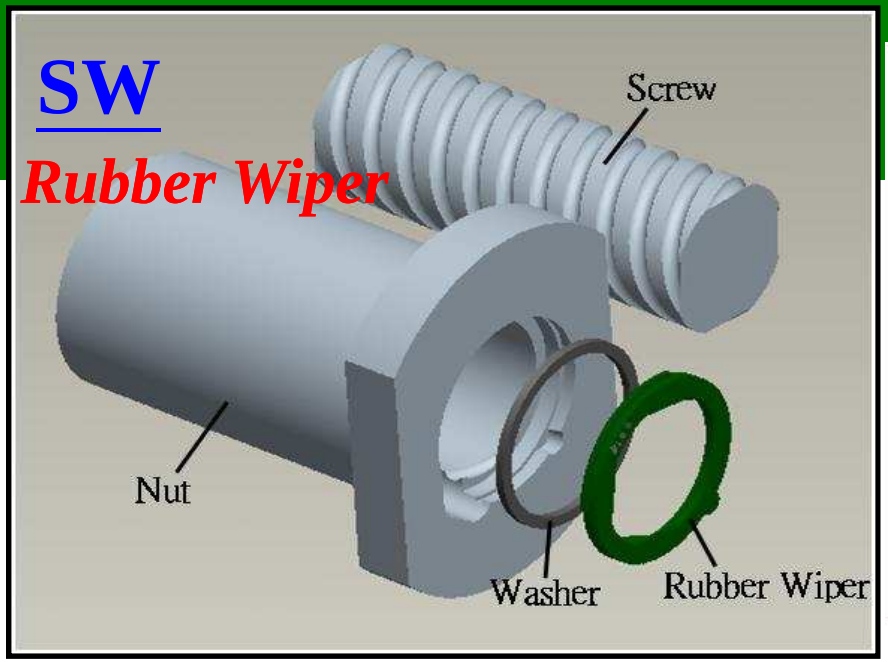


Purpose

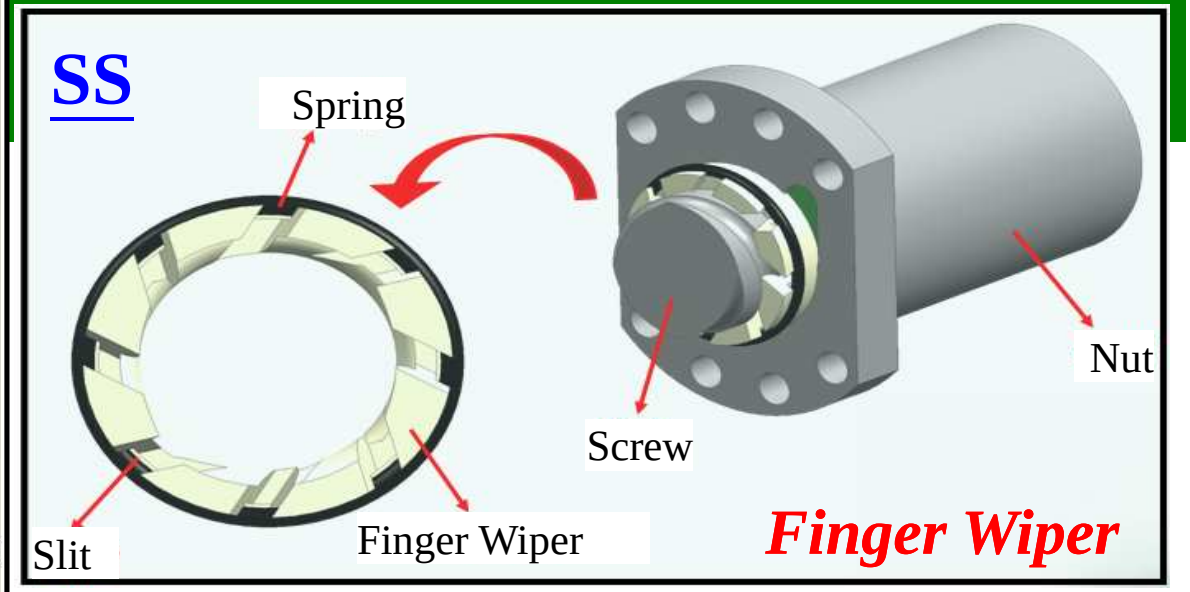
The effective components are designed to improve the dustproof ability of ballscrews. Particle or debris intrusion can impact the ballscrew operation and consequently shorten the service life.

SW

Rubber Wiper



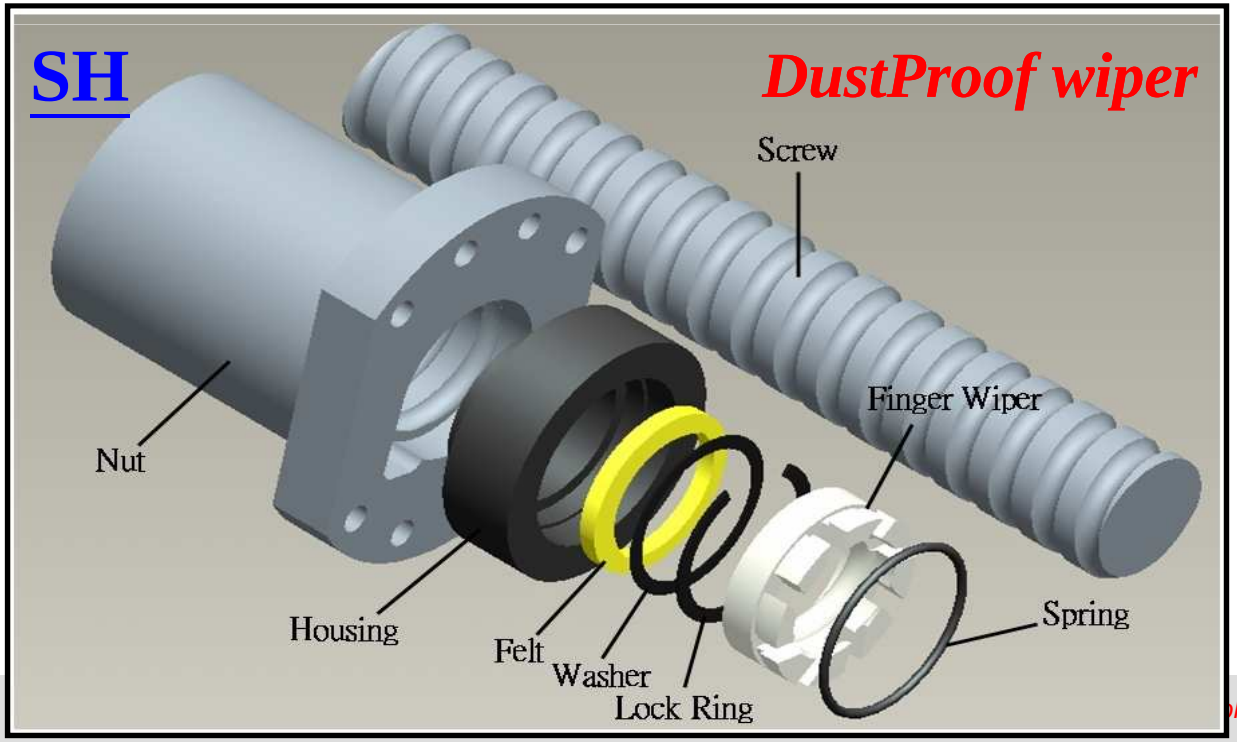
SS



Finger Wiper

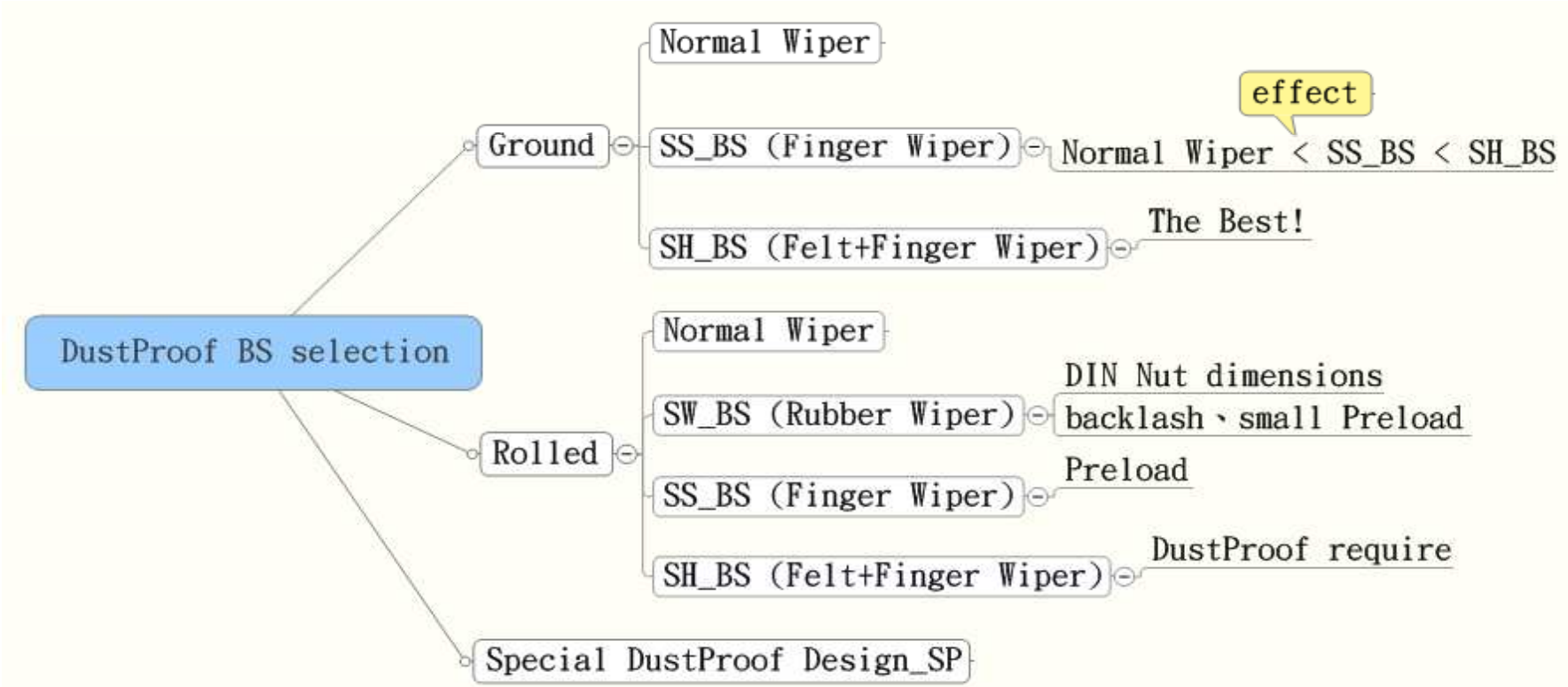
SH

DustProof wiper



Selection

1. Identify the ballscrew: Ground or Rolled
2. For ground BS, the selection depends on the dustproof ability customers require. (dustproof effectiveness: SH > SS > Normal wiper)
3. For rolled BS, the selection depends on the set preload.

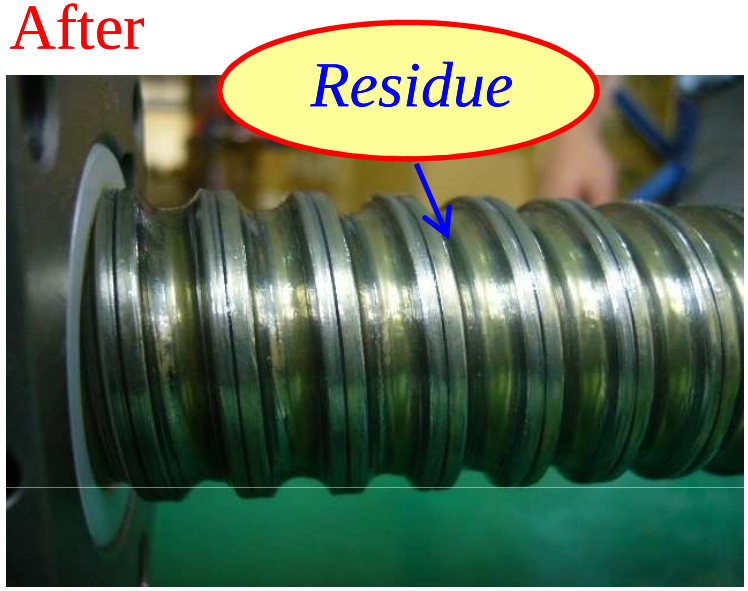


Wiping effect

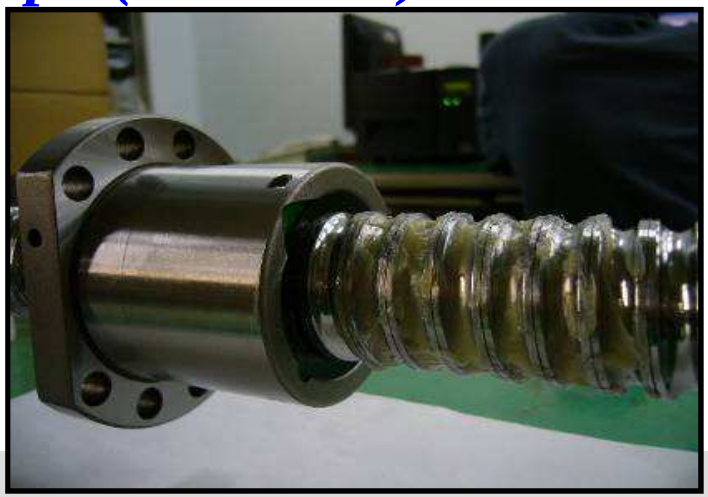
Wiper(R38-10K3)

Before

After



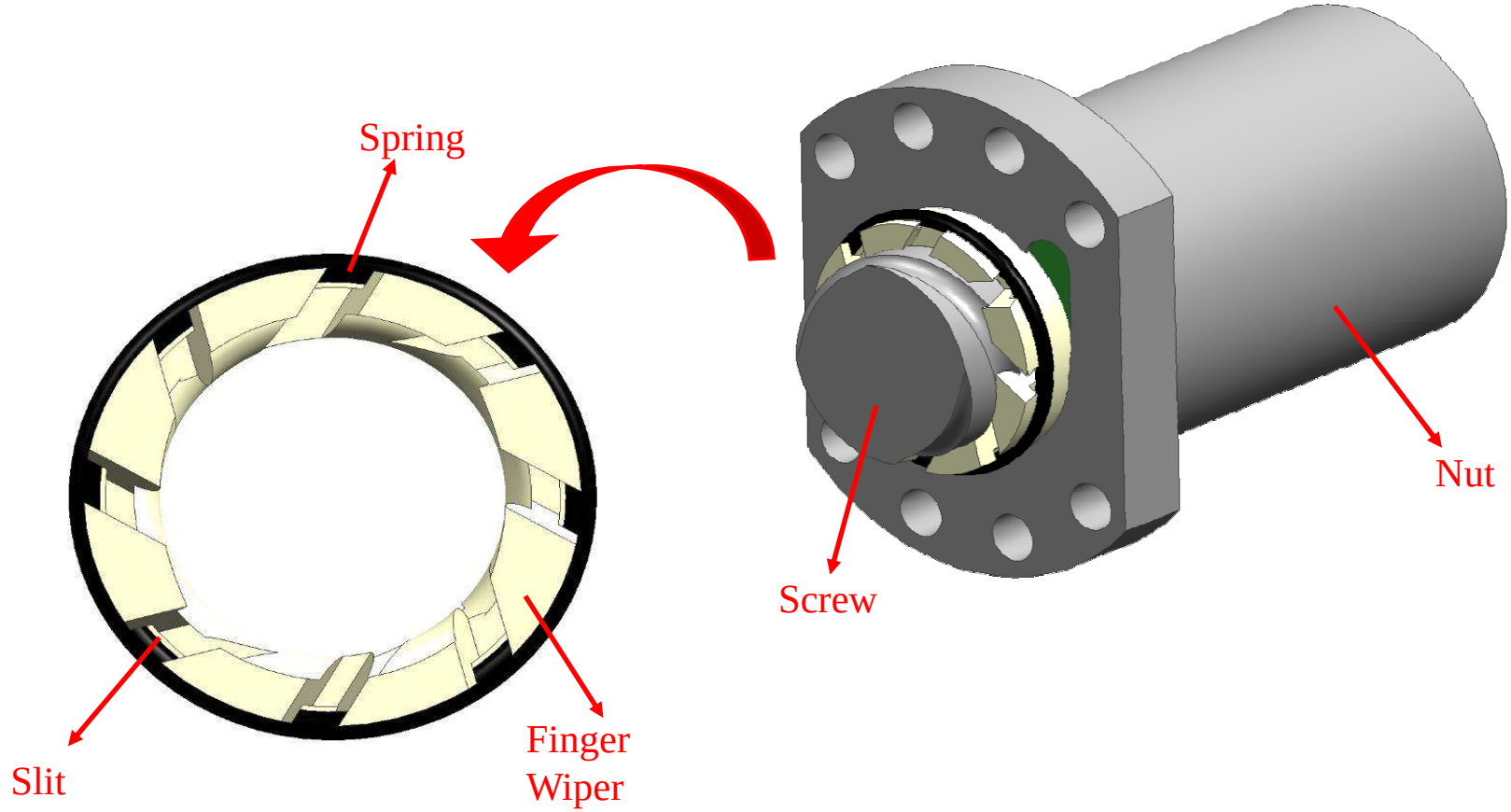
Rubber Wiper(R38-10K3)



Finger Wiper

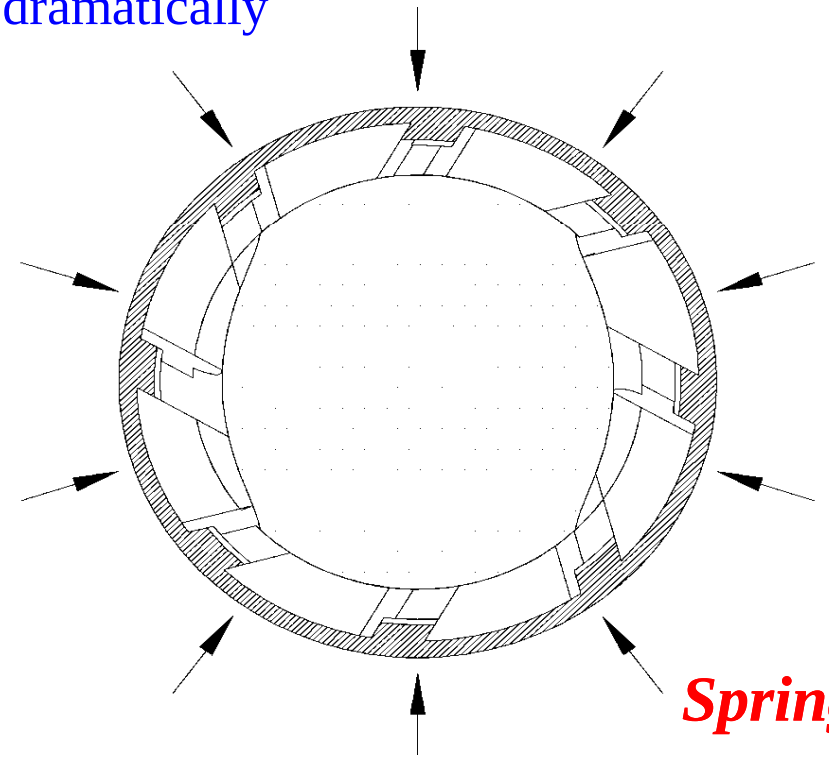
Protruding from the end surface of a ball nut, flexible finger parts are pressed by a spring to eliminate the gap, fit the shaft surface perfectly, and therefore improve the dustproof ability dramatically.

The slit between the fingers can remove the particles scraped from the shaft surface.



Finger Wiper characteristic

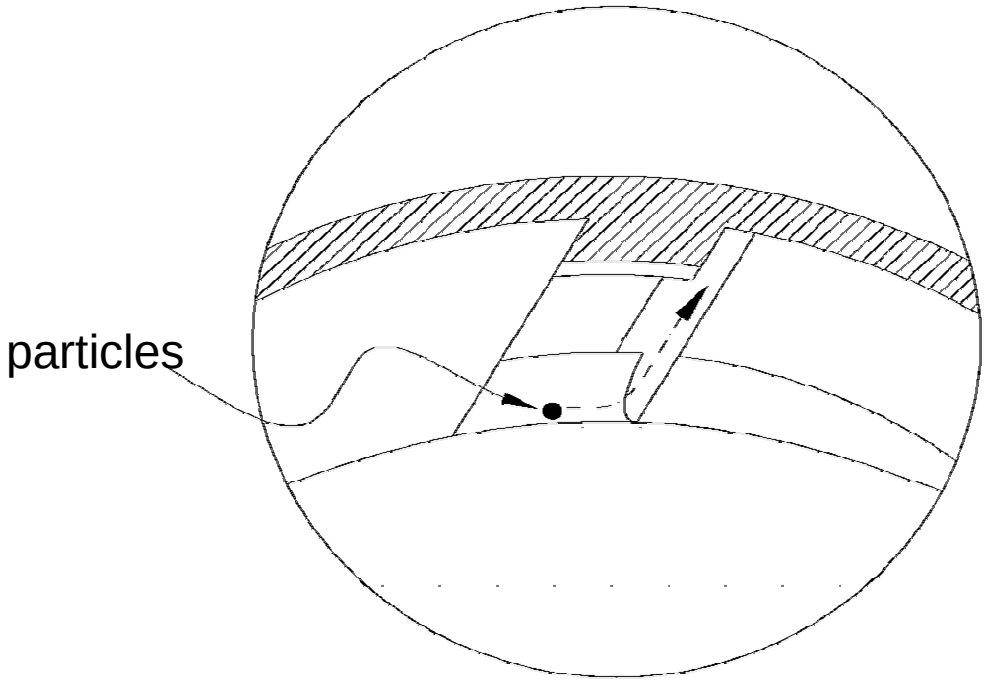
Tight effect：flexible finger parts are pressed by a spring to eliminate the gap, fit the shaft surface perfectly, and therefore improve the dustproof ability dramatically



Spring force

Finger Wiper characteristic

Scrape particles : The slit between the fingers can remove the particles scraped from the shaft surface.



DustProof Wiper

Feature :

Excellence Dustproof Effect :

Spring push finger wiper to fit outer surface of ball screw. This will eliminate the clearance between finger wiper and screw.

High dense felt prevents powdery dust and improve dustproof effect.

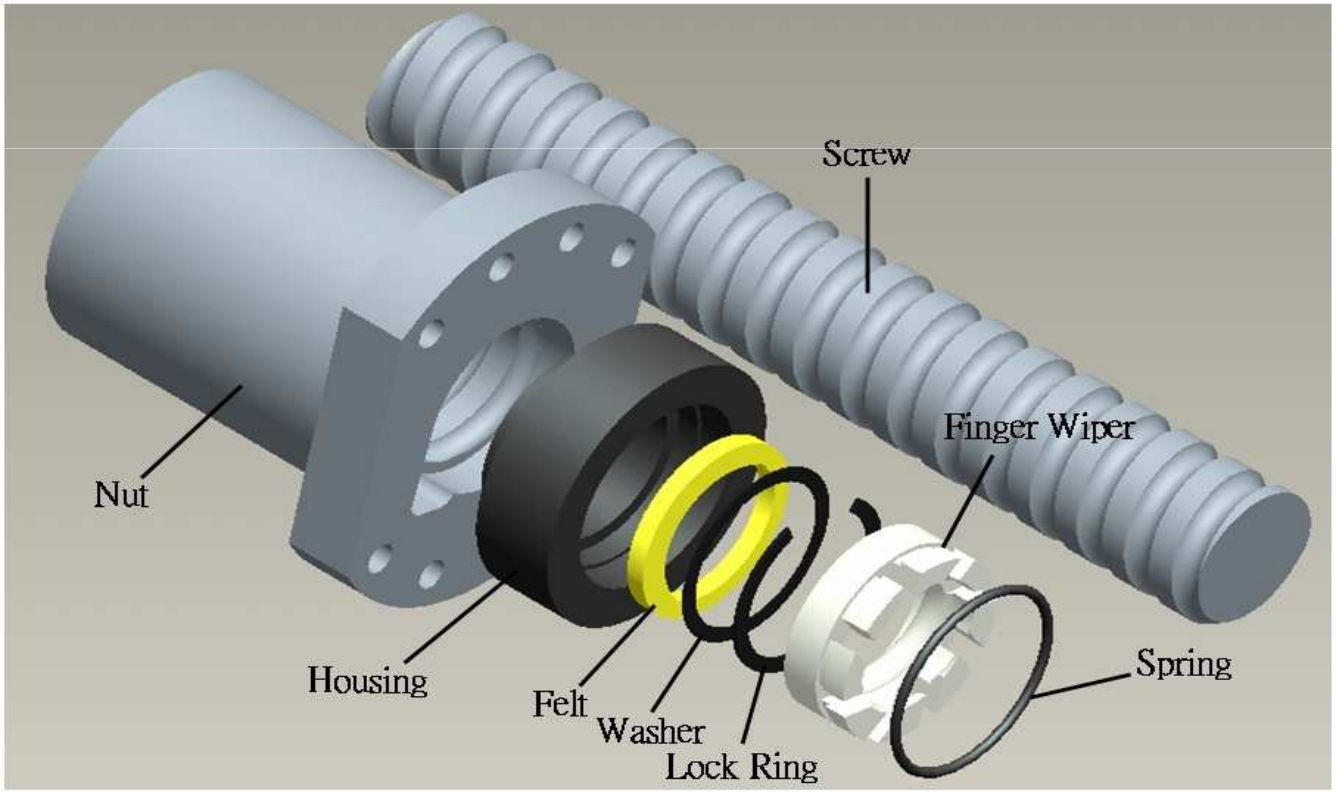
Avoid Dust Accumulation :

Dust will move away from B.S. along tilt slit of finger wiper when B.S. is rotating.

Warning :

Both finger wiper and felt contact surface of B.S..

This induces extra frictional torsion and increases starting torque.



DustProof Wiper

Housing

Felt

Finger Wiper

Washer

Lock Ring

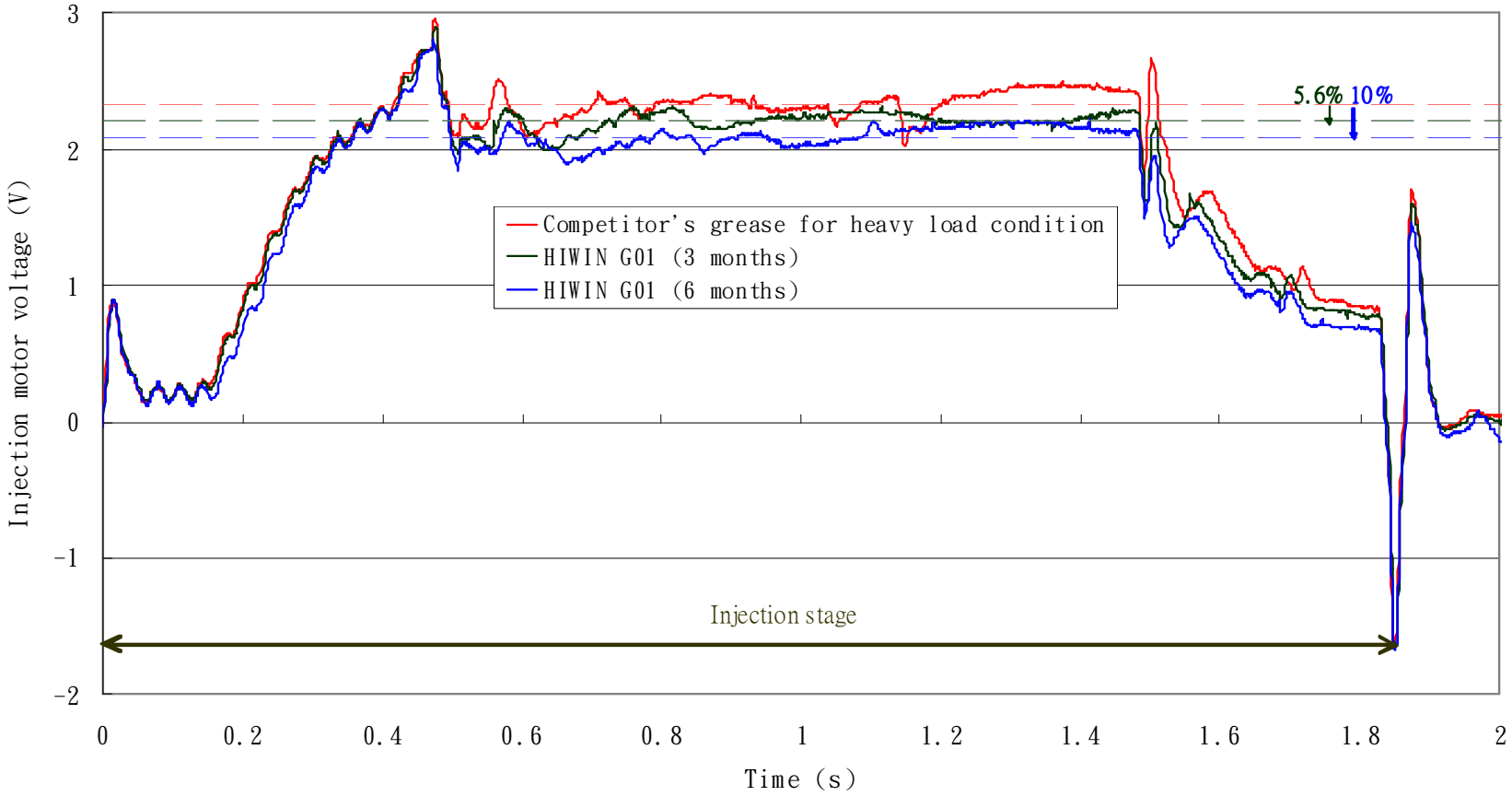
HIWIN Grease

HIWIN Grease

HIWIN Grease	Application	Operational Condition	Base Oil Viscosity (cst/40˚C)	Service Temperature Range (˚C)	NLGI Grade	Origin
HIWIN G01	Heavy Load	Heavy Load BS	500	-15~115	1	Germany
HIWIN G02	Low Dust Generation	DN <120,000	100	-30~140	2	Germany
HIWIN G03	Low Dust Generation (High speed)	DN >120,000	30	-45~125	2	Germany
HIWIN G04	High speed	DN >120,000	25	-35~120	2	Germany
HIWIN G05	General purpose	DN <120,000	200	-35~120	2	Germany

HIWIN G01 - Heavy Load

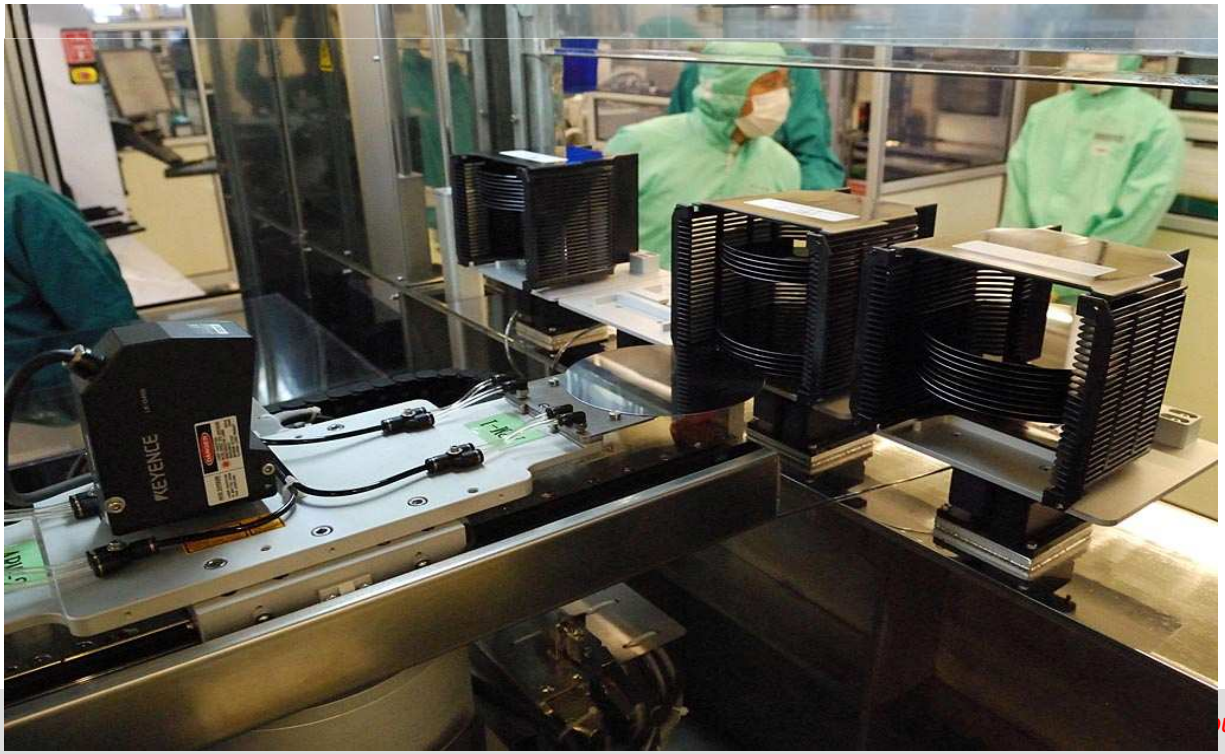
- All-electric injection molding machine(80ton) – motor driving voltage of injection unit BS



HIWIN G02 - Low Dust Generation

➢ Features

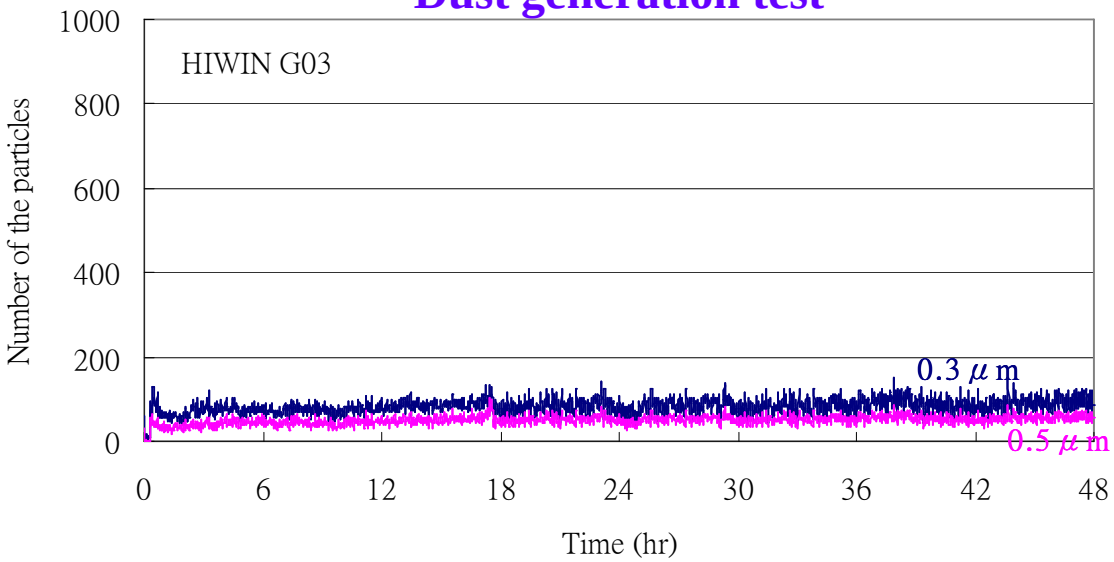
1. Low dust generation, suitable for clean room environment
2. Wear resistant
3. Long term grease, suitable for wide temperature range
4. Consists of synthetic hydrocarbon oil and special calcium soap. resistant to oxidation and ageing
5. Can be used in plastic/steel and plastic/plastic components, compatible with elastomers and plastic materials



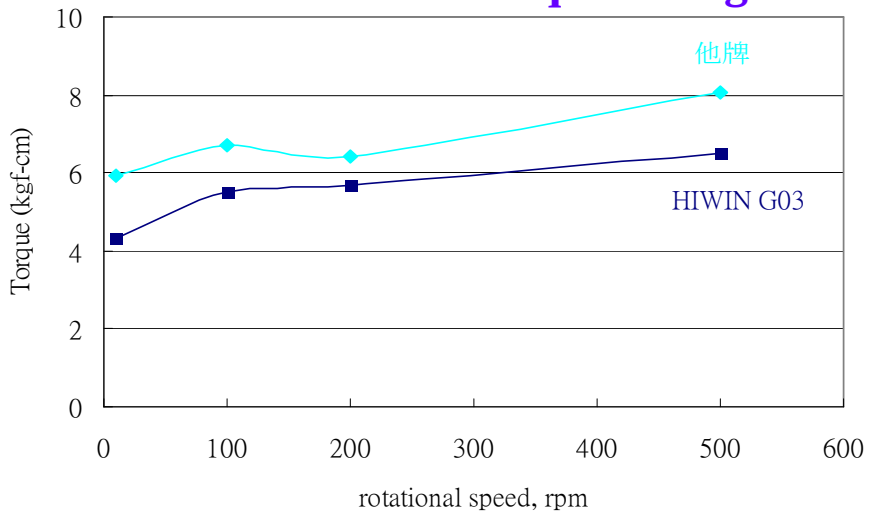
Basic Properties		HIWIN G02
Color		Beige
Base oil		Synthetic hydrocarbon oil
Viscosity enhancer		Special calcium soap
Service temperature range (℃)		-30~140
NLGI-grade (0.1mm)		265-295
Viscosity (cst)	40℃	100
	100℃	15
Drop point (℃)		>180
4-ball test (ASTM D2266)		474μm

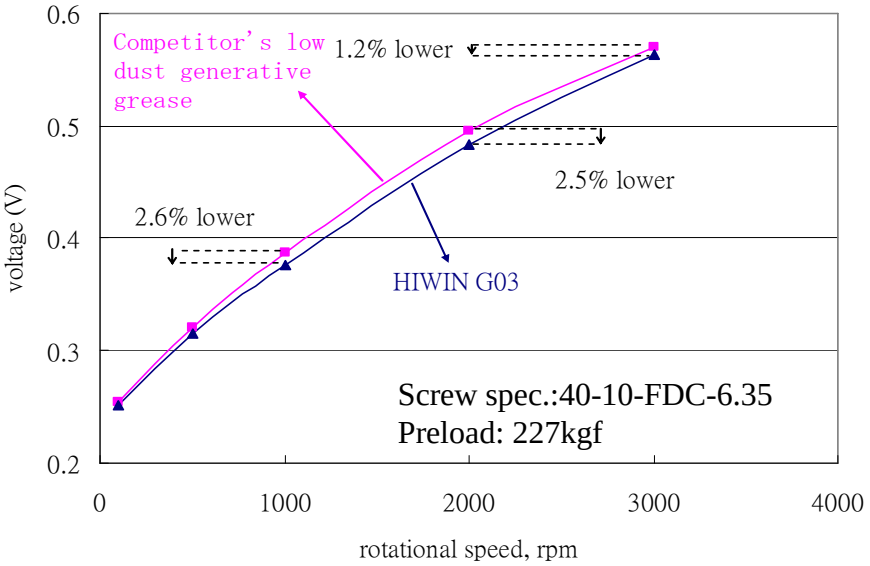
HIWIN G03 - Low Dust Generation (high speed)

Dust generation test

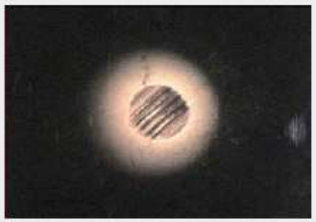
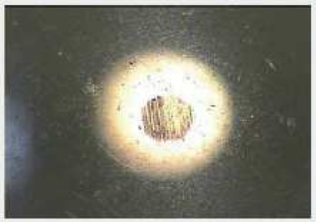


Motor driven torque/voltage test





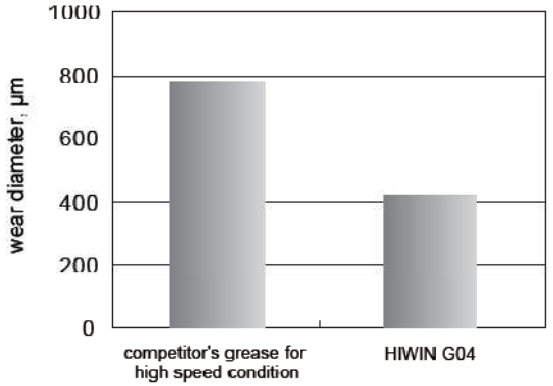
4-ball test (ASTM D2266)

	Competitor's grease	HIWIN G03
Wear Scar		
Diameter (μm)	432	366

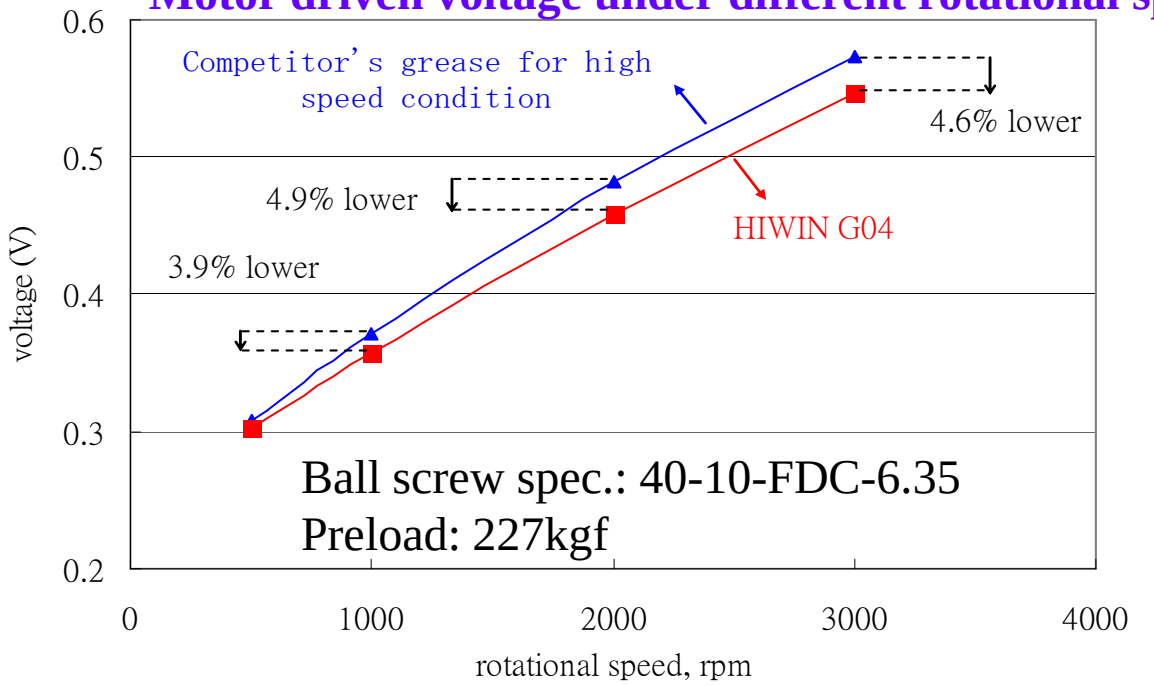
HIWIN G04 - High Speed

4-ball test (ASTM D2266)

	Competitor's grease	HIWIN G04
Wear Scar		
Diameter (μm)	781	418



Motor driven voltage under different rotational speed



HIWIN G05-General purpose

➢ Features

1. Well wear resistance under general conditions
2. Low friction resistance under general conditions
3. Long-life
4. Stable to oxidation
5. Water-resistant
6. Protects against corrosion

Basic Properties

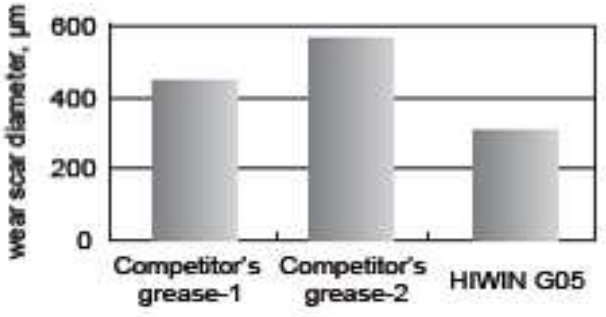
		HIWIN G05
Color		Brown
Base Oil		Mineral
Consistency enhancer		Lithium soap
Service temperature range (˚C)		-15 to 120
NLGI grade		2
Viscosity (cst)	40˚C	200
Drop Point (˚C)		190
4-ball test	Wear scar diameter(μm) (ASTM D-2266)	291
	Welding load (N) (DIN 51350-4)	2600/2800

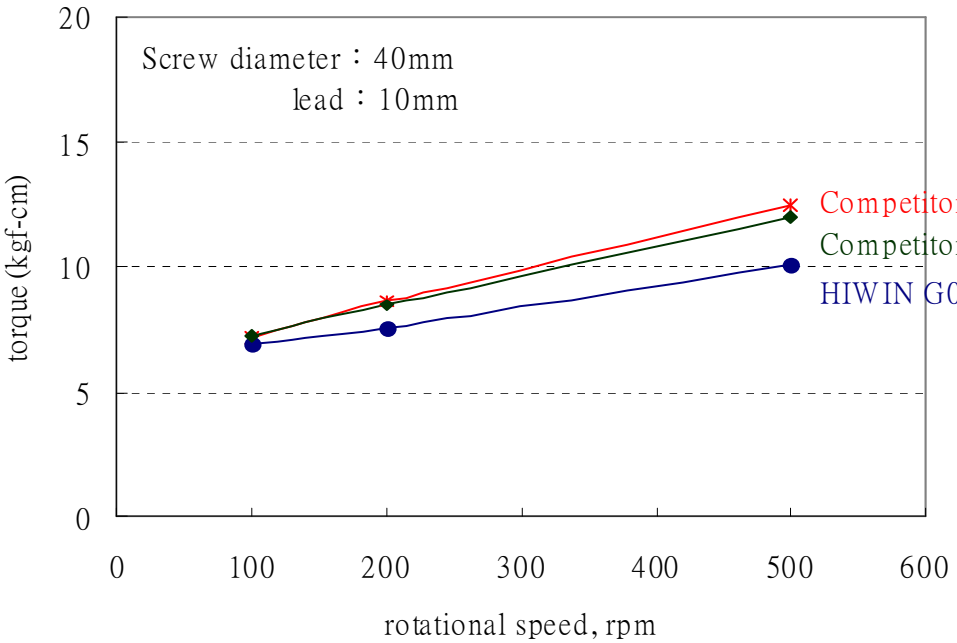
	HIWIN G05	other	note	
Anti-wear	●	▲	4-ball test (ASTM D2266)	increases 38 %~49%
Low Friction resistance	●	▲	increases 16%~19%	
Service temperature range	●	●		

HIWIN G05-General puspose

4-ball test (ASTM D2266)

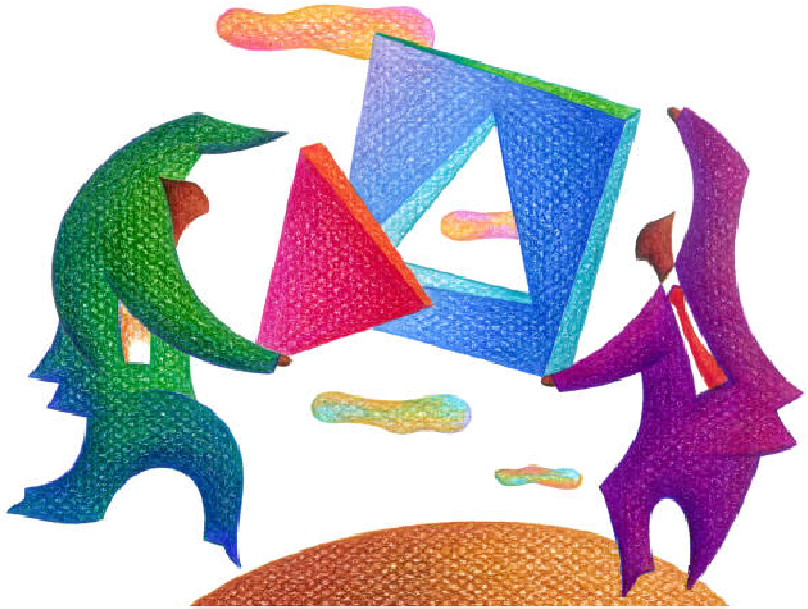
	Competitor's grease-1	Competitor's grease-2	HIWIN G05
Wear Scar			
Diameter (μm)	468	567	291



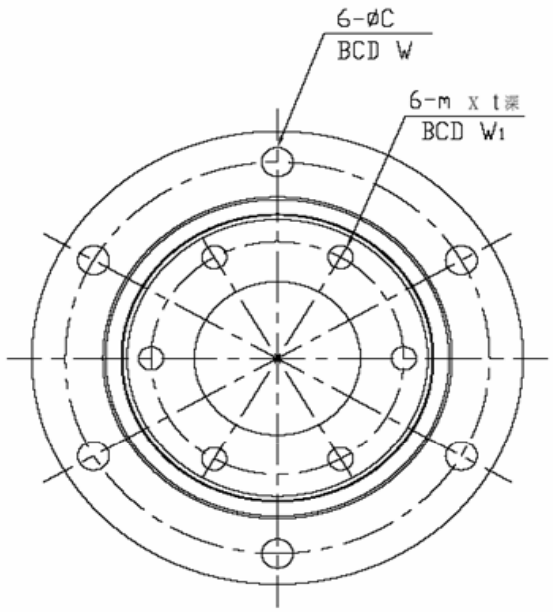


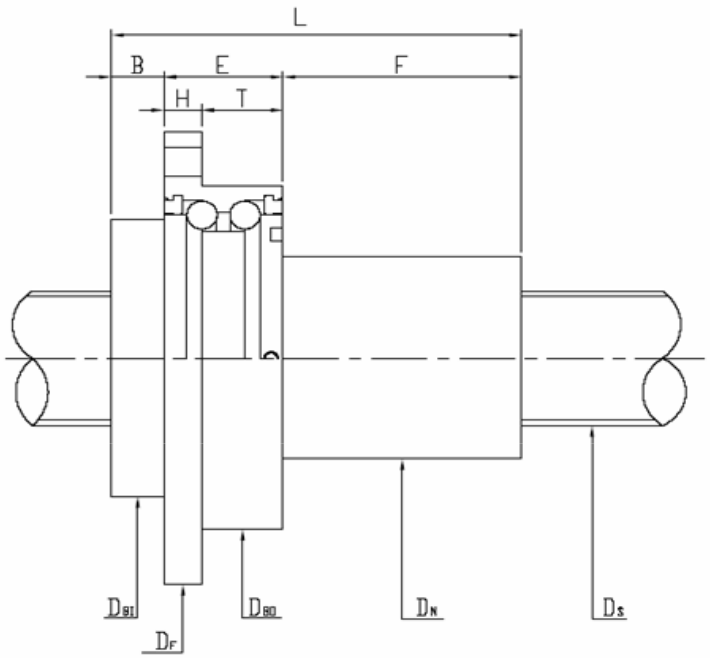
	base oil viscosity (cst/40℃)
Competitor's grease 1	170
Competitor's grease 2	130
HIWIN G05	200

Thank you for your listening



R2 Seris_陳新和





型號	螺桿外徑	導程	螺桿PCD	螺桿珠徑	動負荷	靜負荷	螺帽外徑																軸承部			
																							動負荷	靜負荷	PCD	珠徑
	Ds				Kgf	kgf	DN	DB0	DF	DB1	L	F	E	B	H	T	m	t	W1	C	W		kgf	kgf		
R16-5-T6	16	5	16.6	3.175	1326	2662	30	48	64	36	79	50	21	8	6	15	M4X0.7	6	30	45	56		865	1615	398	3.97
R20-5-T6	20	5	20.6	3.175	1545	3533	34	56	72	43.5	80	50	21	9	6	15	M5X0.8	8	36	45	64		916	1835	45	3.97
R25-5-T6	25	5	25.6	3.175	1773	4627	40	66	86	52	88	50	25	13	7	18	M6	10	43	55	75		1271	2647	54	4.76
R25-10-T4	25	10	26	4.763	2038	4315	40	66	86	52	106	70	25	11	7	18	M6	10	43	55	75		1271	2647	54	4.76
R32-5-T6	32	5	32.6	3.175	2027	6162	46	78	103	63	86	50	25	11	8	17	M6	10	53	66	89		2046	4277	65	6.35
R32-6-T6	32	6	32.8	3.969	2624	7239	48	78	103	63	97	61	25	11	8	17	M6	10	53	66	89		2046	4277	65	6.35
R32-10-T6	32	10	33.4	6.35	4607	10652	54	78	103	63	131	95	25	11	8	17	M6	10	53	66	89		2046	4277	65	6.35
R36-10-T6	36	10	37.4	6.35	5009	12393	58	92	122	72	151	104	33	14	10	23	M8	12	61	9	105		2574	5594	75	7.14
R40-10-T6	40	10	41.4	6.35	5369	14138	62	100	130	79.5	142	95	33	14	10	23	M8	12	67	9	113		2677	6135	82	7.14
R40-12-T6	40	12	41.4	6.35	5369	14138	62	100	130	79.5	167	120	33	14	10	23	M8	12	67	9	113		2677	6135	82	7.14

	生產過
	設計完成
	待設計

陳新和 2010/7/21

R2-優點

1.軸承部體積小

(20-30%)

法蘭一體化，採內循環設計

2.外圈軸承部剛性提昇

(20-30%)

外圈軸承部以背對背形式，因此支撐距離增長，所以抗彎矩能力增加

3.防塵能力提昇

(10-20%)

於軸承部上增加防塵件且防塵件唇部貼附於螺帽本體上

4.組裝容易

大幅縮減調整預壓的時間，調整預壓時僅需旋轉調整件即可，不用調整鋼珠或平磨軸承部大蓋(或預壓片)